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THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

Volume 14, No. 1 January-February, 1964

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THE GARDEN JOURNAL

DOROTHY EBEL HANSELL
Editor

Calendar

January 9, 16, 23, and 30, 1964. Lecture Series sponsored by Volunteer Associates, The New York Botanical Garden, in the French Institute Building, 22 East 60th St., New York.

March 7-15, 1964. Forty-seventh International Flower Show: Theme, "Gardens are for Living." The Coliseum, New York.

March 8-14, 1964. Philadelphia Flower Show: Theme, "Old Philadelphia." Trade and Convention Center, Philadelphia.

March 15-20, 1964. Eighteenth Annual Williamsburg Garden Symposium: Theme "Our Evolving Garden Heritage."

April 18-25, 1964. Thirty-first Annual Historic Garden Week in Virginia.

April 22 - 24, 1964. Garden Forum at the Henry Ford Museum, Greenfield Village, Dearborn, Mich.

April 29, 1964. Members' Garden Party.

April - October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle-Stadion Betriebsgesellschaft m.b.h., Vienna 15, Vogelweidplatz 14, Austria.

May 4, 1964. Annual Meeting of The New York Botanical Garden.

May 21, 1964. Spring Garden Tour, sponsored by Volunteer Associates, The New York Botanical Garden, to Far Hills, Somerville, Peapack, and Gladstone, N. J.

May 22, 1964. Eleventh Annual House and Garden Tour for benefit of the Institute of Physical Medicine and Rehabilitation, New York University Medical Center. For information: Mrs. Edna Blankfort at the Institute, 400 East 34th St., New York.

September 30, October 1, 2, 3, 1964. Nineteenth Annual American Horticultural Congress; October 2 to be spent at The New York Botanical Garden. Hotel headquarters, Commodore Hotel, New York City. Annual meetings of the American Association of Botanic Gardens and Arboretum will be held in conjunction with the Congress.

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Front and back cover illustrations, the Conservatory of The New York Botanical Garden, and frontispiece, the Montgomery Conifer Collection, photographed by Walter Singer; pp. 2-5, Hue: **Lichenes Extra-Europaei**—courtesy of Duke University Library; pp. 7-10, J. J. Wurdack; p. 11, upper left, p. 14, lower right, Hawaii Agricultural Experiment Station, University of Hawaii; p. 11, upper right, p. 12, lower left, p. 13, p. 14, upper right, lower left, **Fruits of Hawaii,** University of Hawaii Press; p. 12, lower left, p. 14, upper left, Bernice P. Bishop Museum, Honolulu; p. 17, Doretta Klaber; pp. 19-22, Arthur W. Ambler; pp. 25-27, Department of Botany, Duke University; p. 29, Georgina Van Rensselaer; p. 30, p. 31 upper right, The Mount Vernon Ladies Association; p. 31, lower right, p. 32, Walter Singer; p. 39, Burpee Seeds; p. 40, Geo. W. Park Seed Co.

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contamination and are therefore absent from metropolitan and industrial centers. In fact, the lichens are such notorius evaders of man's contaminated civilization that the relative abundance of lichens from place to place becomes a sensitive indicator of atmospheric contamination. A reliable estimate of the asmospheric pollution of any settled area is simply the relative abundance of lichens growing there on tree trunks as compared with similar lichen growth in the nearest open country. It has recently been suggested that the reason why lichens die in contaminated atmospheres is due to what is otherwise an adaptive physiological characteristic. It is known that lichens can accumulate and store up certain mineral nutrients present in only tiny quantities in the habitats where they grow. Normally this ability to accumulate mineral nutrients is an asset to the lichen. However, in urban or industrial environments, the lichen may also store up foreign contaminating substances from the atmosphere where these substances may be present in dilute amounts. But accumulations of high concentrations of these substances within the lichen become toxic and fatal.

Fortunately for the lichens, they have no general economic usefulness. If they did, man would surely have exterminated these slow-growing plants in many parts of the world. Perhaps the greatest present value of the lichens to man is an indirect one. The lichens in the Far North are a principal forage crop for caribou and reindeer, the principal food-animals of many peoples of those severe latitudes. The half-appropriate name of one of the commonest species there is "reindeer moss" in English and almost the same, *Cladonia rangiferina,* in Latin. But confusing the reindeer's lichen with a *moss* is a blunder which the reindeer would never make.

Perhaps the most interesting use for the lichens is the oldest one. Since the time of the Phoenicians, lichens have yielded dyes for textiles. The lichen substances have already been mentioned as a minor source of antibiotic substances. The dye-producing properties of the lichens are dependent upon this same group of chemical substances. Orchil is the most important lichen dye, and it is formed from several colorless substances within certain lichens. Upon treatment with almost any alkaline compound (even urine in the cottage of the rural European hand-weaver), lichens containing orchil yield dark red, brown, or purple dyes. The exact shades produced are dependent upon many uncontrollable conditions, and the quality of the dye cannot be precisely regulated from one batch to another. Still this dye is one of the main colorants for dying the yarn used for the famed Harris tweeds.

Unfortunately, the use of lichens as horticultural subjects is almost out of the question except under certain special conditions. The city or suburban gardener can write the lichens off simply because they cannot live in the air he breathes. The country gardener may have more luck, especially with the rock-inhabiting species. The easiest way to get the plants is just to bring already lichen-covered rocks into the garden. This method can be quite successful if one pays careful attention to the light and does not put boulders lushly covered with *Peltigera* from a deep, moist forest into bright sunlight, or put an *Acarospora*-covered boulder which had been in full sun into a cool, dark garden of ferns. Beyond this precaution, moving lichen-covered rocks can be successful. As a matter of fact, I have made such an "instant" lichen garden myself.

Inducing lichens to colonize a new rock surface is another matter. In Japan, where gardens are evaluated by the beauty of the natural patina of age which covers man-made objects, lichens are essential. Stone lanterns flecked with patches of lichens have obviously long been in place (considering the slow growth rate of lichens), and the presence of the lichens delivers the garden from the unforgivable shortcoming of newness. A Japanese botanist told me that when new stone lanterns are placed, gardeners rub them vigorously with wads of grass in the belief that this treatment will hasten the growth of lichens and mosses on them. Although American gardeners might like to follow this advice, I think that scraping a variety of lichens from local boulders, pulverizing them, and dusting the material on the surface hopefully to be lichen-colonized might be more to the point. I cannot, however, recommend even this with any confidence.

The lichens' very elusiveness may contribute to the appeal which they exert on the naturalists willing to go to them. The crystal-fragile, frost-colored lichen heaths near the end of Long Island, the majestically lichen-draped trees of remote ravines in the Smokies, and the multicolored lichen mosaics above timber line in the Rocky Mountains all await the traveler who seeks the subtle beauty of plants.

JOHN EVELYN'S KALENDARIUM HORTENSE

or The Gard'ner's Almanac

By Gertrude B. Foster

Mrs. (Philip) Foster is Editor of the *Herb Grower Magazine*.

John Evelyn, Esq., Fellow of the Royal Society, born 1620, died 1706, was a man ahead of his time. A political figure, courtier, diarist, and contemporary and friend of Samuel Pepys, he might be forgotten today, but for some of his writings. Pepys, whose domestic life was as stormy as Evelyn's was peaceful, says of his friend with whom he survived the plague and fire of London in the 1660's, "In fine, a most excellent person he is, and must be allowed a little for a little conceitedness; but he may well be so, being a man so much above others."

So far beyond others in his far-seeing writings on reforestation was John Evelyn that his two-volume *Sylva: or a Discourse of Forest Trees,* was the first work commissioned by the Royal Society of which he was a founder. At its publication in 1664, the author had so much to say in addition to his subject that he had two other books bound with it. The first edition of *Sylva* is said to include *Pomona: or, An Appendix concerning Fruit-Trees, in relation to Cyder:* and *Kalendarium Hortense* or *The Gard'ner's Almanac;* directing what he is to do monthly throughout the year.

The last, or *The Gard'ner's Almanac,* proved to be the most popular of all Evelyn's works and was reprinted sep-

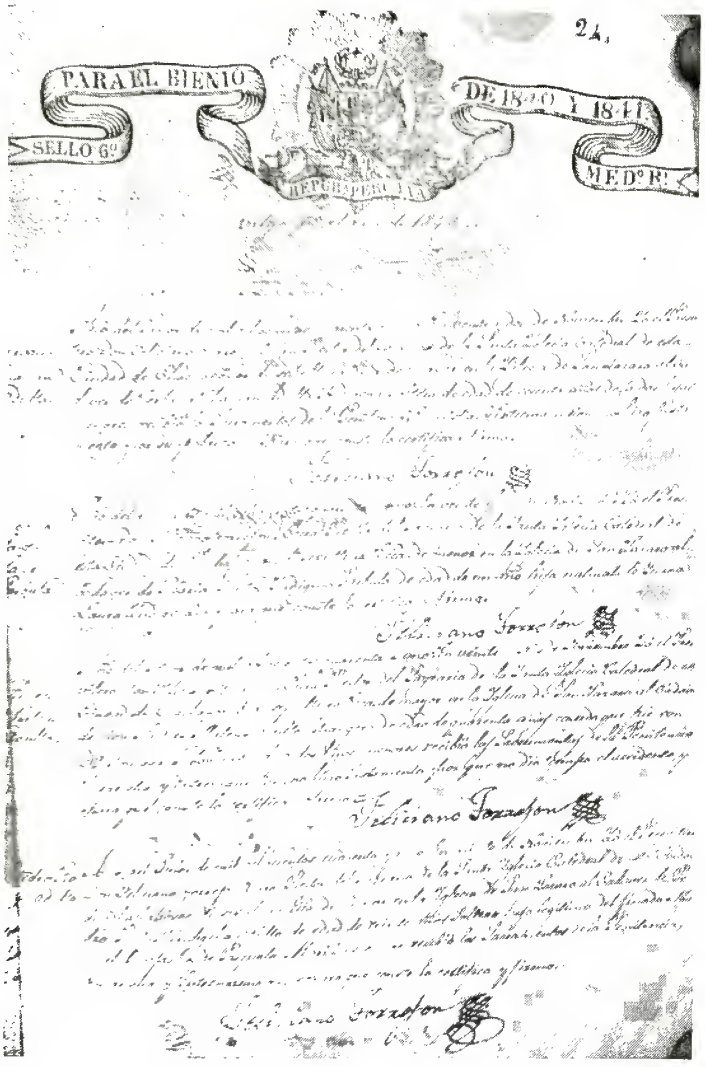
(Continued on page 24)

IN MATHEWS' COUNTRY

By J. J. WURDACK

Dr. Wurdack is Associate Curator, Department of Botany, Smithsonian Institution, United States National Museum, Washington, D. C.

Apart from the standard bibliographic sources, Dr. Wurdack is indebted to the Director of the Chachapoyas Colegio for data on the history of Chachapoyas and to N. Y. Sandwith for information on the Royal Botanic Gardens' (Kew, England) file on Andrew Mathews. The National Science Foundation supported his botanical field work in Departamento Amazonas for eight months during 1962.

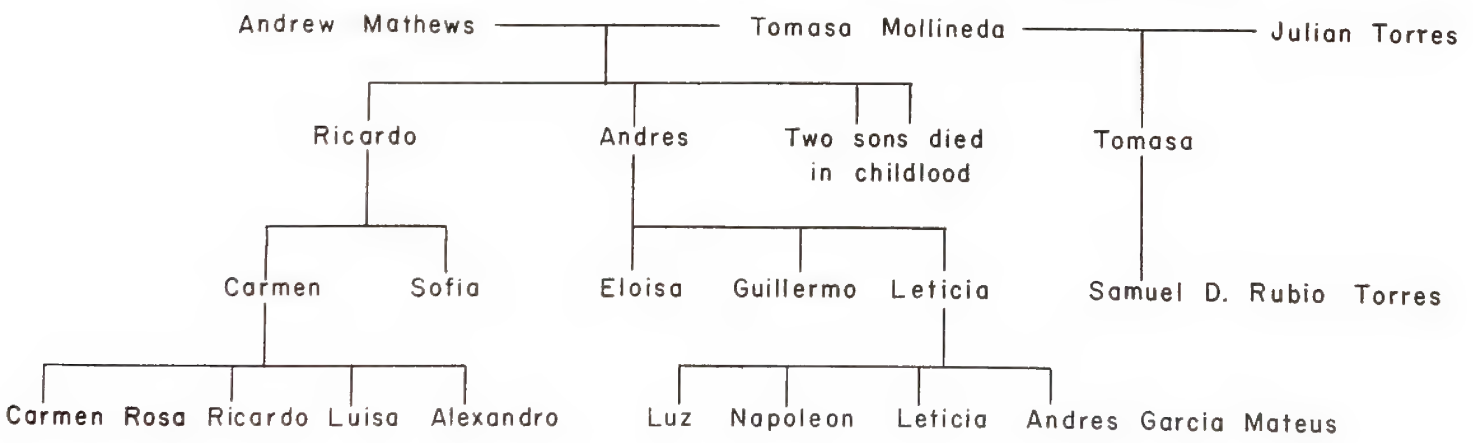


AMONG BRITISH BOTANISTS, none contributed more to Andean exploration than Andrew Mathews, the first naturalist to collect plant specimens in the uplands of northeastern Peru. Mathews' tropical collecting lasted almost eleven years (1831-1841) and encompassed also much of central Peru. His name is commemorated in many Andean species, as well as a genus of the mustard family *(Mathewsia)*.

Mathews began his botanical career as a gardener and published articles in England on the varieties and cultivation of endive, parsnip, cardoon, and egg plant. Only a few personal notes concerning his Peruvian travels and observations were ever printed, but an illustrated manuscript "Flora Peruana" is preserved in the British Museum (Natural History). At Kew is filed much of his correspondence with Sir Joseph Hooker and with John McLean (the latter also a plant collector and merchant in Lima). The largest sets of Mathews' botanical specimens are at Kew and Oxford, with smaller numbers in other European museums and a very few in United States herbaria. Although this brief botanical bibliography indicates that Mathews had retained his scientific affiliation with England, he had given his other affections completely to Peru; thus the Spanish version of his name, Mateus, is particularly appropriate and his Peruvian des-

Mathews burial notice (third on page) translated reads: Andrés Mateus-adult. The year of Our Lord 1841: On the 26th of November, I, the Presbyter Don Feliciano Torrejón, Priest and Rector of the Sacristy of the Holy Church, Cathedral of this city of Chachapoyas, gave holy burial in the Church of San Lázaro to the body of Don Andrés Mateus, adult alien 40 years old married to Doña Tomasa Mollineda and leaving two minor sons, and having received the Sacrements of Penance and Extreme Unction, not leaving a testament because time did not permit, for which I certify and sign.

A partial genealogy of the Mathews family in Peru was furnished by descendants in Chachapoyas.



The upper slopes and summit of Puma-Urcu ("Puma-Mountain") immediately above Chachapoyas still have the same plant species first collected by Mathews.

Eucalyptus groves dominate the general vista of Chachapoyas.

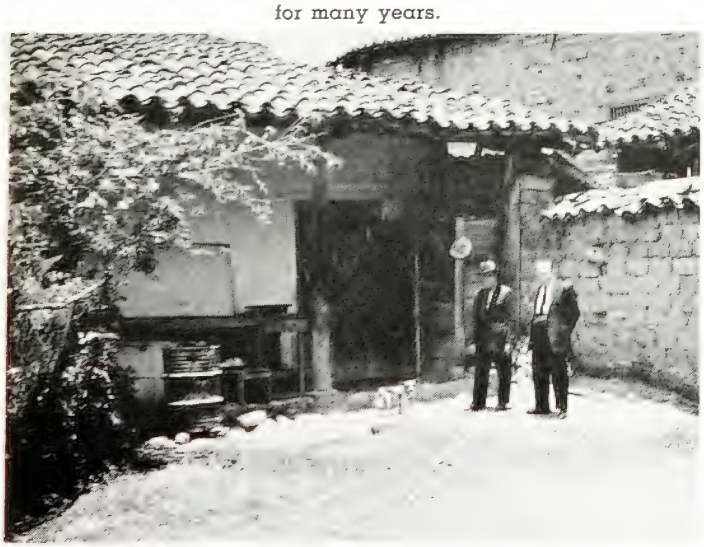
Molinopampa, in the Ventilla Valley, has been a haven from Mathews' time to the present for travelers crossing Piscohuanuma pass to the east.

The cloud-swept Cordillera passes above Molinopampa lead through *jalca* zones of rare Andean plants.

cendants are an illustrious family.

During a six-month trip in 1834, Mathews first visited the cordilleras in Departamento Amazonas and was so struck by the richness and endemicity of the flora that he eventually settled in Chachapoyas, the departmental capital, and died there. Severe earthquakes in 1928 destroyed most of the town, including any possible evidence of Mathews' grave; however, both a death record preserved in the Parroquia del Sagrario de Chachapoyas and living Peruvian descendants provide a direct present-day link to him. Mathews was married to Tomasa Mollineda; of their four children, two survived beyond childhood. Andrés García Mateus, a great-grandson, is the recently retired Vocal (President) of the Superior Court of Amazonas. Doña Tomasa remarried after Mathews' death to Julián Torres (who was later both a congressional delegate and prefect of the department); a descendant of this second marriage, Samuel D. Rubio Torres, today lives in Mathews' original house in Chachapayas. Sr. Torres recalls his grandmother's descriptions of both Mathews (with very blue eyes and fair complexion) and the house, with a large glassed-in bay-window conservatory in which Mathews grew native plants. Andrew's brother, Richard, had settled in Arequipa, where there are probably also descendants today.

Samuel D. Rubio Torres (left) still lives in the original Mathews house in Chachapoyas, while Andrés García Mateus (right) has been one of Chachapoyas' most distinguished jurists for many years.



Mathews' chosen town, San Juan de la Frontera de los Chachapoyas, is one of the oldest New World settlements, having been founded by the Conquistador Capitan D. Alonso de Alvarado on September 5, 1538. (Actually the foundation site was in a nearby town, La Jalca Grande, with a shortly subsequent move to Levanto and, in about 1544, to the present site). The town name commemorates the Chachapoyas Indians conquered by the Inca Túpac Yupanqui (circa 1483-1527); the spirited resistance to the conquest made the name Chachapoyas synonymous with "strong men" during the Inca reign. The town, situated at about seventy-seven hundred feet elevation but with nearby mountains to thirteen thousand feet, had 3,667 inhabitants in 1842 and 8,546 in 1962.

Until three years ago, when a dry-season access road up the Utcubamba Valley provided truck communication with coastal Peru, Chachapoyas and the surrounding mountains remained isolated as in Mathews' day. A few subsequent botanists had made the lengthy pack-animal trip across the cordillera from Cajamarca to Moyobamba (or vice-versa), but none had remained for any extensive period in the region; thus many plant species until very recently were known only from Mathews' original specimens. Perhaps the best-documented, albeit brief, visits were those of August Weberbauer *(El Mundo Vegetal de los Andes Peruanos,* 1945) and Christopher Sandeman *(A Forgotten River,* 1939). Sandeman was lured to the Rio Huallaga and the Andes of Maynas in 1938; he chose the region to avoid the better-known central Andes Pichis trail and Ucayali River travel favored by most visitors going by land from the coast to Amazonian Peru.

Since Sandeman's three-month trip, Dr. Ramón Ferreyra, now Director of the Museo de Historia Natural in Lima, has concentrated much of his extensive field work in the Huallaga Valley (a region of potential agricultural development), thus continuing the lowland exploration started by Mathews and Sandeman. The upland regions east of Chachapoyas today still remain accessible only on foot or by horse, and the routes are as described by earlier travelers; Raimondi, the classic Peruvian naturalist and geographer,

in 1868 said that parts of the trails "passed the limits of bad and could only be described as horrible." These transport difficulties have preserved much of the natural vegetation, in contrast to the widespread man-made destruction found in Piura and Cajamarca. The upland Amazonas flora, characterized by a high percentage of endemic species, is more closely related to that of the southern Ecuadorian *"páramos"* than to the species of the rest of Andean Peru. The isolation of montane Amazonas will be partially destroyed when a projected road, for which route surveys were completed late in 1962, is extended from the Utcubamba Valley through Pomacocha and across the cordillera east of Yambrasbamba into the Río Mayo Valley. Still, the rugged uplands will remain a refugium for the rare plants first collected by Andrew Mathews.

Sunday market in Chachapoyas overflows into the street.

FRUITS AND VEGETABLES IN HAWAII

By MARIE C. NEAL

Miss Neal is Botanist of Bernice Pauahi Bishop Museum in Honolulu, Hawaii. She is the author of *In Gardens of Hawaii*, a revised edition of which is soon to be published.

(Continued from November - December, 1963)

THE MUSTARD FAMILY, *Cruciferae,* is well represented in Hawaii, especially by head cabbage, cauliflower, radishes, and turnips. Asiatic additions include the Oriental radish or *daikon (Raphanus sativus* var. *longipinnatus),* from China and Japan, which produces cylindrical or globose, white roots twelve by three inches, larger or smaller. These are eaten cooked with soup, often flavored with ginger. The leaves in the seedling stage are used for greens. Watercress *(Nasturtium officinale)* is sold in large quantities and is often prepared by frying with bacon, or it may be broken up and cooked with pork and flavorings. About twelve varieties of Chinese cabbage *(Brassica pekinensis)* are grown in Hawaii. One variety has heads of pale, tender, wrinkled, mild-tasting leaves which are commonly cooked with soy sauce. Another cabbage, *pak choi (B. chinensis),* is sometimes curiously altered for food; if salted down for a month with rice bran, salt, and water, the vitamin-B content quadruples, while much of vitamins C and A are lost. Some Orientals who lack sufficient protein take advantage of this alteration.

The horse-radish tree *(Moringa oleifera)* from eastern India is popular with Filipinos. This small tree bears panicles of white flowers, fernlike compound leaves, and long, narrow, three- to six-angled pods. The roots are used like horse-radish, and the leaves, flowers, and young fruits are edible.

Members of the Rose Family, *Rosaceae*—its apples, pears, peaches, strawberries—do best in temperate regions, though at least one kind of plum succeeds at altitudes of about four thousand feet in Hawaii. Two kinds of large-fruited, native raspberries are found at high altitudes; the wild, red-fruited thimbleberry *(Rubus rosaefolius)* from southeastern Asia grows from low to high altitudes; and a blackberry, possibly of American origin, has taken over as a weed at altitudes of about four thousand feet, smothering other vegetation.

Among legumes is the ice-cream bean, borne by a tropical American tree *(Inga laurina)*, the edible, sweet, white pulp surrounding the seeds in a somewhat cylindrical pod. Another legume, the *opiuma* or Manila-tamarind *(Pithecellobium dulce),* has swollen, red, black-seeded pods with similar pulp; whereas the tamarind *(Tamarindus indica)* has velvety brown pods with a sticky brown pulp which is edible raw and also yields a pleasant-tasting syrup. One of the sesbans *(Sesbania grandiflora),* which is a native tree of tropical Asia, furnishes food used by Filipinos. The large, pea-shaped, white flowers, three inches long, and the young pods, to two feet long, are edible when cooked.

Peanuts succeed in Hawaii in areas of suitable soil and climate, but they are grown only on a small scale. Hawaiian markets usually offer Chinese peas *(Pisum sativum* var. *macrocarpon)* which have tender, edible pods, as well as edible seeds, and are a choice vegetable, either cooked and eaten alone or mixed as in chop suey. Fresh string beans are one of the commonest vegetables in the markets, lima beans are rather rare. Bean sprouts are of two kinds. The mung bean *(Phaseolus aureus)* yields sprouts about an inch long, with white stem and root and two tiny, yellow leaflets; they are prepared by boiling three minutes and then seasoned. Less common are soybean sprouts *(Glycine max),* larger and somewhat tough; but ripe soybeans cooked in their pods are a valuable food served as a meat substitute.

The yam bean root or chopsuey potato *(Pachyrhizus erosus),* from tropical America, is a top-shaped, crisp, pleasant-tasting tuber. It is sliced and cooked with pork and seasonings. The linear green pods, one to three feet long, of yard-long beans *(Vigna sesquipedalis)* are picked when young and prepared the same as string beans. They are related to

Horse-radish tree, *Moringa oleifera.*

Carambola or star fruit, *Averrhoa carambola.*

cowpeas (*V. sinensis*), which have shorter, wider pods. Both these vegetables are from southern Asia as is another legume, the goa bean (*Psophocarpus tetragonolobus*), with pods about eight inches long, one inch wide, and having four winged angles. The pods are cut into short pieces and boiled.

The carambola or star fruit (*Averrhoa carambola*), a Malaysian tree in the Oxalis Family, is cultivated for its fruit. This is waxy-looking, greenish yellow, oblong, two or more inches long, and deeply five-angled. Under the thin skin is a juicy, acid, pleasant-tasting pulp. Of two varieties raised, one is sweet and good to eat when raw; the other, more acid, is good preserved.

The Orange Family, *Rutaceae,* includes many valuable fruits, and though many citrus fruits are grown in Hawaii, lemons, oranges, and grapefruits are shipped in from California to supply the demand. A kind of sweet orange, a small sour one, some kinds of limes, and the shaddock (*Citrus maxima*) grow well locally.

The acerola or cerezo (*Malpighia punicifolia—Malpighiaceae*), a shrub or small tree from tropical America and the West Indies, bears vitamin-yielding fruits which are red, globose, and half an inch in diameter. In Puna, Hawaii, the acerola gave promise of a thriving industry. Hundreds of acres of the species were planted, and great quantities of the fruit were shipped to the mainland by a local company. But recently competition with synthetic vitamin firms on the mainland has interfered and prevented its continuing success.

The Euphorbia Family, *Euphorbiaceae,* is represented by the *kukui* or candlenut tree (*Aleurites moluccana*), which is distributed from Polynesia to southern Asia. It is the State tree of Hawaii, and in the leis of the Hawaiian Islands its flowers and leaves represent the Island of Molokai. The tree bears edible nuts with hard, black shells and oily, white kernels; these are eaten only after being cooked, sometimes being baked, pounded, and mixed with salt and red peppers as a relish. Formerly the salt was obtained by evaporating sea water.

Mangoes originated in India. In Hawaii they are numerous in quantity and kind, as more than forty horticultural varieties have been imported from time to time. Among the choicest kinds which are eaten raw are 'Pirie' and the handsome 'Haden'. Some are cooked, being stewed or added to chutney and marmalade. Many acres of the cashew nut tree (*Anacardium occidentale*), a native of tropical America, also in the Mango Family, *Anacardiaceae,* were planted in Hawaii; they thrived at one time, but the industry did not.

The litchi or lychee (*Litchi chinensis*) is a popular fruit tree from southern China. It has been growing in Hawaii since 1873, and several varieties have been planted in many gardens. The fruit is globose and has a knobby, red shell surrounding juicy, white pulp. The fresh fruit is prized for its delicious flavor and grapelike texture, which is little changed when canned; when dried as "litchi nuts," the fruits resemble raisins. In Honolulu, the fruits develop during the second quarter of the year. The longan or dragon's eye (*Euphoria longana*) is similar to the litchi, but the fruits are smaller and less desirable. Both the litchi and longan are members of the Soapberry Family, *Sapindaceae.*

Among many kinds of grapes which have been experimented with in Hawaii, in the hope of developing a major industry, only one kind has been found to survive attacks by insect pests. This is 'Isabella', a loose-skin, blue-fruited hybrid Labruscan grape, a cross of the fox grape (*Vitis labrusca*) of eastern United States and the wine grape (*V.*

Litchi or lychee, *Litchi chinensis.*

vinifera), native from southeastern Europe to India. The excellent fruit is occasionally marketed, but the industry is small.

A minor fruit tree is the Panama berry *(Muntingia calabura),* in the Linden Family, *Elaeocarpaceae,* from tropical America. The fruit is a globose, smooth, red berry containing juicy, sweet pulp and many small seeds.

Food-yielding plants in the Hibiscus Family, *Malvaceae,* found in Hawaii include okra *(Hibiscus esculentus)* and the roselle *(H. sabdariffa),* both of which are grown on a small scale. The Bombax Family, *Bombacaceae,* includes the Guinea chestnut tree *(Pachira aquatica)* from South America, which produces edible seeds (saba nuts), and the durian *(Durio zibethinus)* from Borneo, a tree bearing ovoid, foot-long, spiny fruits with delicious-tasting but unpleasant-smelling pulp.

Rarely found in the market is the fruit of a climbing shrub from China, the Chinese gooseberry *(Actinidia chinensis),* a pleasant-tasting, ovoid, hairy, green berry about two inches long. The Ceylon gooseberry *(Dovyalis hebecarpa)* bears purplish berries which are eaten raw or made into jelly and preserves; its relatives, the rukams *(Flacourtia* spp.), are best made into jelly.

The Mangosteen Family is represented in Hawaii by mangosteen trees, but the fruit does not develop successfully. Several kinds of passion fruit, most of them from tropical America, thrive, and one variety with yellow fruit is even grown commercially for juice. It is the yellow *lilikoi (Passiflora edulis f. flavicarpa)* of horticultural origin. This is a form of a similar vine bearing edible, purple fruit *(P. edulis),* originally from Brazil and now growing in Hawaii. The giant granadilla *(P. quadrangularis)* may also be found wild, and some other species are cultivated. As is true with all passion fruits, the choice part is the juicy, tasty pulp surrounding each of the many small seeds in the central cavity. With the fruit of the papaya *(Carica papaya),* which is somewhat similar, the arrangement is reversed; the thick, juicy wall of the fruit, not the pulp surrounding the seeds, is the choice, edible part. This fragrant, sweet-tasting, orange-colored fruit has always been a favorite here; it is commonly served raw with lemon or ketchup and is a good source of vitamins A, C, and G. Papaya juice is sold in cans. *C. papaya* was an early introduction to Hawaii from tropical America. The seeds inside the shell of the pomegranate *(Punica granatum)* are surrounded with a juicy, tasty, reddish pulp, the only edible part of this handsome-colored fruit.

The Myrtle Family, *Myrtaceae,* supplies varied and valuable fruits. One of the best, though in some areas despised as a weed, produces fruit equal to oranges in vitamin-C

'Pirie', one of the choicest varieties of mango.

Papaya, *Carica papaya.*

Yellow passion fruit, *Passiflora edulis f. flavicarpa.*

content. This is the guava *(Psidium guajava),* a small tropical American tree of which a few varieties are known, especially the lemon guava, the source of flavorful jelly, jam, and juice. These are prepared in home kitchens and also prepared commercially for sale in jars or cans. This fruit is lemon-shaped, and the exterior yellow pulp surrounds a layer of pink or cream-colored, acid pulp within which is a juicier pulp full of small hard seeds. Another species, the strawberry guava *(P. cattleianum)* from Brazil, has smaller, purple-red fruits with white pulp, used for jam and jelly.

The allspice tree *(Pimenta dioica)* is grown here and there in Hawaii but not widely. Belonging to the genus *Eugenia* is the mountain-apple *(E. malaccensis),* a native tree of India and Malaya now growing wild in Hawaii. Short-stemmed flowers and fruits develop on the trunk and branches. The thin, crimson skin of the mountain-apple covers crisp, white pulp enclosing a large, round seed—the pulp is eaten both raw and as a sweet pickle. Other edible eugenias in Hawaii are the Surinam-cherry *(E. uniflora),* rose-apple *(E. jambos)* Java-plum *(E. cuminii),* and Spanish-cherry *(E. dombeyi).*

The Jesuits nut *(Trapa bicornis)* is a floating herb from Eurasia. The nutlike fruit, two to three inches wide and with two curved horns, contains one large seed. During a fall festival the Chinese eat the boiled nuts while still warm.

The Parsley Family, *Umbelliferae,* with its many useful vegetables and kitchen herbs is well represented in Hawaii. Besides these, small seedling plants of coriander *(Coriandrum sativum)* and young leaves of honewort *(Cryptotaenia canadensis)* are used like parsley, and water dropwort *(Oenanthe laciniata),* an aquatic herb resembling young, slender celery plants, is an ingredient of soup prepared by Orientals.

Among several native species of cranberry *(Vaccinium)* the best known is the *ohelo,* which was formerly common around Kilauea Volcano, and considered sacred to the volcano goddess Pele. It is a dryland, small shrub bearing an abundance of mild-tasting, red or yellow berries, eaten raw or cooked for sauce. Hawaiians still use the leaves for tea.

The Sapodilla Family, *Sapotaceae,* has six or more genera in Hawaii. But neither the chicle tree *(Manilkara zapota)* nor the red sapote *(Calocarpum sapota),* both of which are growing here, are known for their fruits which are favorites in their homes in tropical America. And the egg-fruit *(Pouteria campechiana* var. *nervosa)* from South America, with its orange fruit and mealy, sweet, orange pulp is more of a curiosity than a useful fruit. The star-apple *(Chrysophyllum cainito)* is an ornamental tree from tropical America with shining, copper-backed leaves. The translucent white pulp of its green-skinned, apple-shaped fruit is edible.

For Oriental persimmons, Hawaii depends on California to provide fresh fruits, which develop better in cooler climates, whereas the mabolo or brown persimmon from the Philippines succeeds at low altitudes in Hawaii. Olive trees grow well, but do not bear fruit.

The Periwinkle Family, *Apocynaceae,* includes some poisonous plants, others with edible fruit. The Natal-plum *(Carissa grandiflora)* a thorny African shrub used in Hawaii for hedges, bears ovoid, red berries with reddish, milky pulp. They are edible raw or are used in jelly.

Besides the sweet potato, which is a popular vegetable in Hawaii, the Morning-Glory Family, *Convolvulaceae,* is represented by another edible plant, the swamp cabbage *(Ipomoea aquatica).* This aquatic, creeping, succulent herb, brought here by early Chinese immigrants, is prepared for the table by being fried quickly in peanut oil and flavored with soy sauce.

Ceylon gooseberry, *Dovyalis hebecarpa.*

Lemon guava, a variety of *Psidium guajava*.

Mountain-apple, *Eugenia malaccensis*.

Kitchen herbs, of which many are mints, are well known in Hawaii. Less well known on the mainland is an Oriental mint, *che-so (Perilla frutescens* var. *crispa)*, an herb with a natural distribution from India to Japan. It has purplish leaves and stems and a balsam-like odor. Small, young plants are added as flavoring to Oriental dishes—in one recipe they are mixed with cucumbers and shrimps.

Perhaps having a unique use to Westerners, who know it only as an ornamental, is the Chinese matrimony-vine *(Lycium chinense)*. This shrub, which has long, spreading, spiny branches, is native to eastern Asia and a member of the Tomato Family, *Solanaceae*. It bears orange berries, but the edible part is its foliage, not its fruit. The ovate leaves, about an inch long, are cooked by Orientals in soup with

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Ground-cherry *(Physalis peruviana)*.

Bitter lemon, *Momordica charantia*.

THE AMERICAN GENTIANS

By DORETTA KLABER

Mrs. Klaber, who specializes in rock garden plants and formerly ran Cloud Hill Nursery, is the author of *Rock Garden Plants, New Ways to Use Them Around Your Home.* The material presented in these columns is based on the American section of the fall chapter of her book on Gentians for American Gardens, to be published by M. Barrows & Co. in March, 1964. Copyright for the text and illustrations is held by the author.

IF YOU SPEAK OF GENTIANS to the average American gardener, the usual response is, "Do you mean the fringed or the bottle gentian?" Perhaps you mean neither. You may be speaking of the wonderful spring gentians of Europe which include *Gentiana acaulis* and *G. verna;* or the easy and floriferous summer-blooming *G. septemfida* and *G. decumbens;* or the fall-blooming beauties from the Himalayas and Japan; or still others, for there are hundreds of gentians throughout the world. If you were talking about American gentians, you might have had any of over two dozen species in mind.

American gentians are found from north to south, from coast to coast, including Alaska. Some grow in meadows, some in woodland and bogland, others on mountains. They bloom in late summer and fall. I have attempted to mention all those which are or may soon be available as seeds or plants. Certainly in this country we should be able to obtain them; I hope more will appear shortly in commerce.

Many of these gentians are suitable for woodland or natural gardening and some, as you can see from the accompanying sketches, will grace a rock garden or another special location.

The bottle gentian, *G. andrewsii,* is one of the eastern species. It is usually spoken of as *the* closed gentian, but there are a number of species with this characteristic. It bears clusters of white-tipped, blue flowers from late August on for a number of weeks. The stems are leafy, and the plant may grow from fifteen inches to two feet high. Bumble bees open the flowers from the top, but to all appearances the flowers remain tightly closed, like big, fat buds. When *G. andrewsii* is well established, it spreads into a large patch, making a fine display. I have a dwarf, six- to eight-inch-high variety, which I find more attractive than the tall forms; it has flowers of a very good medium tone of blue. There is also a cream-white form which is a pleasant accent among the blue. The foliage of *G. andrewsii* is not as firm and elegant as that of its relative, *G. villosa,* but otherwise they look much alike.

Among other closed gentians are *G. cherokeensis,* also from the East, a late-flowering dainty species with clear blue flowers which are large for the size of the plant, and *G. clausa* which grows two feet high and has glossy leaves and big flowers. If you are looking for a tall plant, you might consider *G. clausa;* it is one of the finest of this group.

Gentiana menziesii, a foot-high western species, appeals to me, for there is something quaint about its freckled, clear blue flowers which never fully open. *G. orfordii,* close to *G. menziesii* and sometimes considered a dwarf form of the latter, should also prove delightful. *G. sceptrum,* a tall western species with deep blue flowers, is recommended for waterside planting.

I have read glowing descriptions of *G. saponaria,* the soapwort gentian, but to me it seems to be just another leafy plant with nearly closed flowers. These are blue or white. Although *G. saponaria* begins to flower in August, it may still be flowering in November—so the plant is not to be scorned.

Gentiana villosa, found in South Carolina, Georgia, and Pennsylvania, is called the green gentian. The common name is a misnomer, however, as there are creamy white forms, also pale blue and rose, each with contrasting stripes. The large, almost closed flowers are clustered at the top of the stems which grow six to eight inches high. The leaves, a silvery green, have a firm texture. *G. villosa* is worth growing it seems to me, for the foliage alone. It is a late bloomer, starting in October.

There are a number of fringed gentians. Beginning in alphabetical order, there is *G. barbellata* from the Rockies, which grows about six inches high and has silvery leaves and fringed, steel-blue flowers. Since it is native to mountain meadows, it should be given a peaty, moist but well-drained soil in the garden. *G. barbellata* is unique among gentians, not only because of its odd appearance but because of its fragrance. In fact, it is the only gentian I know that is fragrant. The late Mrs. Kathleen Marriage, well-known horticulturist and plant collector, said, "You get the odor of it before you see it. It has a spicy smell like Christmas cookies baking." It seems incredible that no one has attempted to hybridize *G. barbellata* with other gentians in an effort to introduce fragrance, the only thing missing in this glorious group of plants.

Ah! *the* fringed gentian. *G. crinita* is not the only fringed gentian, but with many wild flower lovers in the East, it will always hold that special place. Who could forget his first sight of this gentian as a drift of soft blue in a moist meadow and, on closer inspection, of the beautifully fringed four-petaled flowers? It is alas! only biennial, hard to see before it blooms, and dying after it blooms. I have raised it from seed—but getting this gentian established is another matter. One must create the right conditions for it, if they do not already exist in the garden. To those who concentrate on native species, this one will be a challenge. David Benner, Botanist at Bowman's Hill Wildflower Preserve at Washington Crossing, Pennsylvania, is well on the way to getting *G. crinita* established there.

This is the method he developed. He makes a seed bed of one-half of meadow soil gathered beneath large cedars, with one-quarter of fine sand, one-eighth of shredded sphagnum and leafmold, one-eighth of well-rotted manure, and some finely ground limestone. These ingredients are thoroughly mixed and watered with horticultural hydrogen-peroxide ("Dovol") to prevent blight and damping-off of the seedlings. The mixture is allowed to stand for a week, then it is covered with half an inch of red-cedar needles and watered

again with the "Dovol" solution. The seeds, gathered from wild plants in October after heavy frost, and when the dry heads indicated ripeness, are shaken out of their pods, allowed to dry for a day or two, and then stored in a bottle in the refrigerator until planting time. This, for Mr. Benner, is in very early spring.

Mr. Benner thinks there may be a definite relationship between red-cedars (which have a neutral rather than an acid reaction as do many other evergreens) and fringed gentians—and perhaps some other gentians. Whatever the reason, he has the best results in germinating seeds of the fringed gentian, when he uses a medium in which red-cedar soil and needles are incorporated.

I have found that many plants, other than gentians, do exceptionally well under red-cedars, but my interpretation is that the needles form a fine humus which is kept open and friable by the annual addition of needles. Not all gentians would do well in such a soil; the Himalayan and some of the western American species definitely need a soil with an acid reaction.

H. Lincoln Foster of Connecticut writes, "*G. crinita* is at home in openings in the woodland garden. I have moved in year-old seedlings from along moist banks and back roads to fill in the off years. Those here originally have multiplied, but the big show, until I filled in, was every other year. Now *G. crinita* plants appear in the most unlikely places, generally where the soil has been disturbed. They have a hard time seeding in leaf cover, thick grass, and the like. Seedlings dry out, but one-year-old plants endure dryness."

The best known of the western fringed gentians is *G. thermalis (elegans),* which may be annual or biennial. Comparing it with *G. crinita,* you will notice that it is a lower-growing plant, with four-petaled flowers much less fringed than those of its eastern relative. *G. thermalis* colors acres of meadow land with blue-purple sheets. P. L. Ricker, in a pamphlet published by the Wild Flower Preservation Society, writes, "In Yellowstone Park it forms such large waves of blue that for the flower lover it is almost worth a trip to see that [sight] alone."

Interesting eastern species, neither closed nor fringed, include *G. autumnalis (porphyrio),* which is found in full sun in the pine barrens of New Jersey and elsewhere. It is a delicate beauty carrying one flower to a stalk, deep blue with white throat and emerald dots—and there is a lovely pure white form. *G. autumnalis* needs a sandy, peaty soil in a very moist spot—with good drainage, however. My plants remain small, but this species does grow taller, up to a foot or more. Mrs. Mary Gibson Henry, well-known botanical explorer, speaks of having found a striking rose-colored form in North Carolina.

The striped gentian, *G. decora,* a species native from Virginia to Georgia, grows from eight to ten inches high, with firm-textured leaves and flowers borne in clusters at the top. The flowers have much of the beauty of form of the flowers of *G. ornata* from Nepal, though the habit of growth and coloring are quite different. The flowers are white with faint stripes of blue, or blue with white and dark stripes, or old rose with white stripes or the reverse. This gentian needs moist, well-drained soil, but is not too demanding.

Another species native to the same area, Virginia to Georgia, and found in sandy, peaty locations, is *G. parvifolia.* It makes a plant about two feet high and produces one-inch-long, blue flowers in October and November. They turn maroon as they age; frequently there is a spike of both colors. Mrs. Henry says she once found an especially lovely pale rose form.

Gentiana pennelliana is on the order of *G. autumnalis,* with narrow leaves but larger, exquisite white flowers and almost black buds. Surprisingly it comes from Florida—at least this surprised me. It is rare in that state and probably would not be hardy in the North; where it is hardy, it should do well in moist peaty soil in full sun. In the hope that gardeners will watch for and protect *G. pennelliana,* I include it in this chapter.

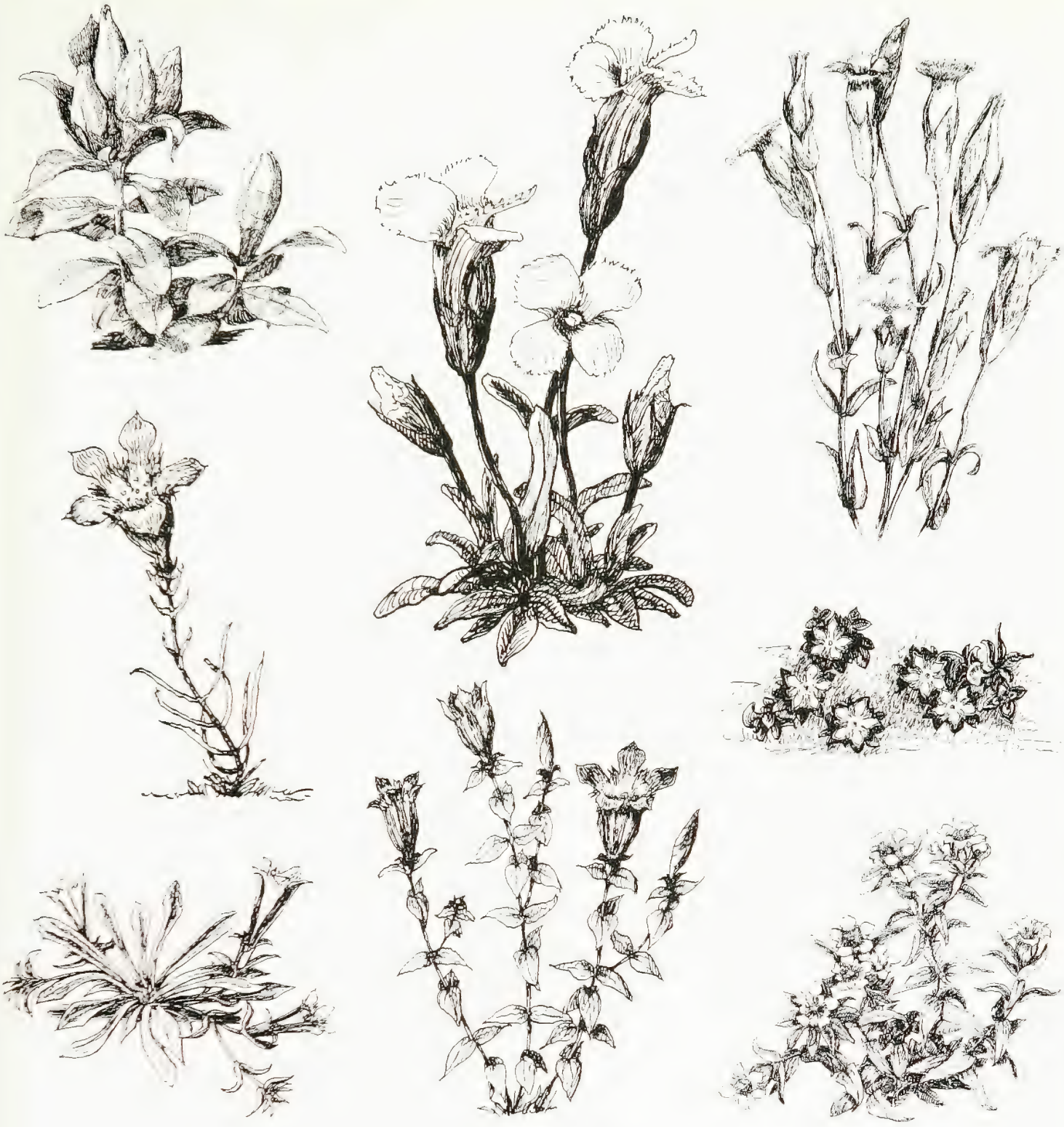
Found in swampy places in western states is *G. affinis.* I have received seed so labeled, but the seedlings turned out to be not true to name. If you obtain seed from a reliable nursery or professional grower or collector, this fortunately does not happen often. *G. affinis* is a foot-high plant, with leafy stems bearing two or three blue flowers at the top and in the axils of the upper leaves.

One of the very fine western gentians is *G. calycosa,* which grows from four to eight inches high—the more compact, the better its appearance. It is found on gravelly stream or lake banks where water is present, but the soil well-drained. The open bell-like flowers are a deep, soft blue with white throat and touches of reddish purple, as so many gentians have. In *Western American Alpines,* Ira N. Gabrielson describes the flowers as a dark velvety blue; where he found them in rich woodland soil, they undoubtedly were. Those I grew in my garden in Quakertown, Pennsylvania, were very much like the colored illustration of them in G. H. Berry's book, *Gentians in the Garden,* of a soft blue with maroon exterior. As you know, the conditions under which plants are grown affect size, color, and general appearance. Mine were in an open position in gritty soil, on the edge of a rill which had flowing water in spring but required help from a hose in summer.

Gentiana newberryi from the mountains of California and Oregon, is only two inches or so high, with leaves spreading into mats from a central crown. The outside of the flower is a very pale blue, while the inside is white with green dots. *G. newberryi* blooms from August on and is said to be very easy to grow if given a sunny, moist, well-drained location.

Mrs. Marriage always referred to *G. parryi* as one of the loveliest of the Rocky Mountain gentians. She equated it with *G. calycosa* as some botanists do, but to me it seems entirely different. Dr. Gabrielson says it is taller (up to fifteen inches) than *G. calycosa* with a rather weak straggly growth and up to five flowers at the end of each stem, instead of a single one as in *G. calycosa.* (It does show only one flower at the end of a stem in young plants.) *G. parryi* comes from rather drier situations than does *G. calycosa* and spreads into mats eighteen inches wide. It should be planted in rich peaty soil and then be left alone to produce from August onward its masses of dark gentian blue flowers, unrivaled by those of any other American alpine as Dr. Gabrielson says. The greenish white throat of the flower is striped with black.

Botanists sometimes equate *G. platypetala* from Alaska with *G. calycosa.* It grows from eight to ten inches high and is a stout plant with very large roots. The coloring of



Top row, left to right. *Gentiana villosa, G. thermalis, G. crinita.*
Center row, left, *Gentiana autumnalis;* right, *G. douglasiana.*
Bottom row, left to right. *Gentiana newberryi, G. calycosa, G. parryi.*

these two gentians is similar, as I noticed from the slide of *G. platypetala* Mrs. Strutz kindly sent me. In Alaska it is considered the most beautiful gentian because of its large, brilliant blue flowers. The deepest blue occurs at the top; the color pales towards the base and is marked with narrow blue stripes. The stems are mahogany-colored.

Then there is *G. glauca,* an alpine plant from Alaska, the Rockies, and parts of Asia. It may be only two or up to eight inches high, depending on the conditions under which it is grown. In my rock garden, where it is making nice bushy little plants, it gets a daily watering with the hose when there is no rain fall. Mrs. Louis Strutz of Alaska writes that though *G. glauca* is not a showy plant, its small flowers are an intense blue-green, "like that of a blue-bottle fly," and it is reliably perennial.

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My Friends, the Wildlings of The New York Botanical Garden

By ARTHUR W. AMBLER

Mr. Ambler, a Certified Public Accountant, devotes his leisure time to nature photography, and one of his favorite haunts is The New York Botanical Garden. He is a member of the Garden, also of The New York Zoological Society and the National Audubon Society.

Part I — INTRODUCTION

If thou art worn and hard beset
With sorrows that thou would forget,
If thou wouldst read a lesson, that will keep
Thy heart from fainting, and thy soul from sleep,
Go to the woods and hills! LONGFELLOW

IN A PREVIOUS issue of *The Garden Journal,* I directed the readers' attention to the many advantages afforded city dwellers in visiting parks and undeveloped areas where the casual observer, nature student, and photographer can find an inexhaustible supply of subjects. I selected The New York Botanical Garden to illustrate my point, because for many years I have been a frequent visitor there and have observed, studied, and photographed the flora and fauna within its grounds. Any park or natural area would, of course, serve the same purpose, and I suggest to the younger generations that they use their spare time to visit such places and study nature and perhaps, as a desirable adjunct, to take up nature photography. Once embarked in this pursuit, they will soon recognize that the natural world is a great theater and that the dramas enacted are greater than man has written. They are constantly changing, and no two performances are alike. The principals of these dramas have characteristics peculiar to themselves. Animals possess many human-like traits, and their "native intelligence," their capabilities are not fully comprehended. Ruskin said, "The truths of nature are one eternal change, one infinite variety. There is no bush on the face of the earth exactly like another bush; there are no two trees in the forest whose boughs bend into the same network, nor two leaves on the same tree which could not be told one from another, nor two waves in the sea exactly alike." Here is sufficient reason and inspiration to look into the mystifying composition and behavior of nature's subjects.

It was many years ago when, as a very young man, I was introduced to The New York Botanical Garden by adults who had enjoyed its attractions. Like many youngsters of that day, as well as now, I favored that section of the Garden through which flows the Bronx River, with the rugged woodlands on either side. My young mind conjured up many adventures which could be had there, and I pictured strange animals lurking in the woods where Indians once roamed and hunted. Fanciful mind pictures are part of the child's world, but do these imaginative pictures vanish as the years pass, and knowledge and experience enable one to separate fantasy from fact? Not wholly, for I still roam the woods in search of animals, and each trip is an adventure.

Have I found what I was seeking? Indeed, I have. Wild animals in the woods, on the water, in the air, and lovely wild flowers in many places. I never tire of my roamings for, in Emerson's words,

> "Within these plantations of God a decorum and sanctity reigns, a perennial festival is dressed, and the guest sees not how he should tire of them in a thousand years."

I like to recall a conversation I had with a young friend. We were standing on the stone bridge admiring the stately hemlocks *(Tsuga canadensis)*, one of the few remaining stands in this region, when he said, "When I look at these trees, I feel so small and humble." "Why," I asked, "do you feel that way?" He thought a few moments, then replied, "Man has learned to understand some of the workings of nature. Based on such knowledge, he has been able to accomplish many things which in the past would have been considered fantasies of fictional writers; but he is still unable to make a seed which, when sown in the soil, will develop into a living tree and it in turn produce seed."

His remarks brought to mind these words of Hume:

> "It is a great mortification to the vanity of man that his utmost art and industry can never equal the meanest of nature's productions, either for beauty or value."

The wooded land within The New York Botanical Garden is old in point of time, and within the period of my reporting there have been changes, but movement has been slow and scarcely noticable. True, the trails show wear from many feet, some of the trees and shrubs show signs of long life, others not so strong have succumbed to wind storms, ice and rain, and new generations are growing up to fill their places. The wild flowers of the woods and meadows come into bloom each season. Regrettably some of the rare kinds have disappeared, but there still remain a number of interesting ones. And the Garden is creating a native plant garden in which these gems will be planted for observation and study.

Each season of the year is endowed with a beauty of its own. There is a continual arrival and departure of wild things, and these, when viewed with the permanent residents of the area, present ever-changing pictures. The nature student and photographer should become acquainted with the time schedule and habits of wildlife, be it animal or plant, especially if he is in quest of specific subjects.

Within the alloted space, I shall introduce some of the little wild things I have met in my meanderings along the banks of the Bronx River and the surrounding woodlands, and in the open fields—all within the confines of The New York Botanical Garden. The pursuit of the study of nature

The Bronx River flows through The New York Botanical Garden, with rugged woodlands surrounding it.

requires effort, fortitude, and no end of patience—the conditions under which the photographer must operate may at times stretch his patience to the breaking point. There is a certain amount of excitement, of anxiety and tension, and a considerable amount of hard work in procuring pictures of wildlife. Animal subjects have an exasperating habit of being uncooperative, unpredictable in behavior, even retiring from the field entirely. Wild flowers, of course, are rooted and remain in their particular locations until they fade and die, or are removed one way or another. But the photographer must watch them closely in order to take them at the acme of bloom.

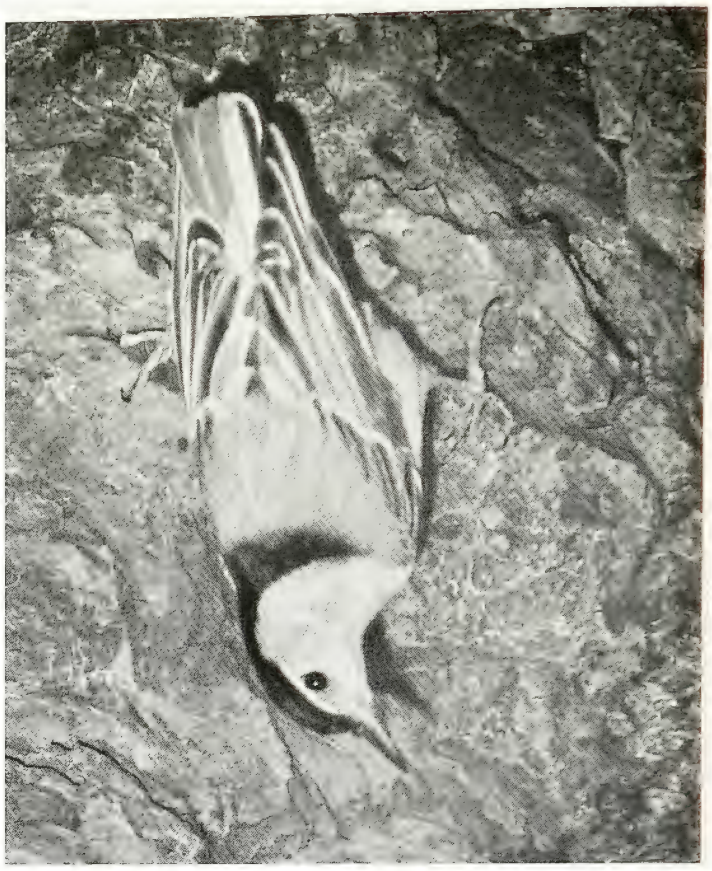
To find plants and other forms of wildlife especially out of the ordinary, is the goal of all "hunters." There are occasions when strolling through The New York Botanical Garden, one meets with surprises. Consider the words of John James Audubon, directed primarily to painters, which may well be heeded both by the observer and the nature photographer.

> "It may—indeed it not infrequently *does*—happen that after days or even weeks of fruitless search, one enters a groove, or comes upon a pond, or forces his way through the tall growth of a prairie, and suddenly meets with several objects, all new, all beautiful, and perhaps all suited to the palette. Then how delightful will be his feelings, how marvelously all fatigue will vanish!"

Part II — Winter

All nature feels the renovating force
Of winter, only to the thoughtless eye
In ruin seen. THOMPSON

Winter, to many, is the season of the year least favored, largely because there is discomfort in the cold, in wind storms, and lowering skies. And there is a lugubrious aspect of the countryside, in the light of a sunless sky, the remains of annuals, the dormancy of perennials, and the loss of life and brilliant coloring which gratifies the senses in other seasons. Winter is clothed mostly in grays and browns, but



there is beauty in these muted tones, in the outlines of deciduous trees and shrubs. And there is color, too, in the sharp blue of the sky on a crisp, clear day, the sparkle of sunlight on ice and snow, and the deep greens, the blue- and gray-greens of evergreens, and the colorful plumage of blue jay and cardinal.

When I arose early one February morning, I saw that snow had fallen during the night. It took courage to venture forth in a temperature several degrees below zero, but I knew that some of my animal friends in the Garden would have difficulty satisfying their appetites because of the white blanket covering the ground. I carried a bag filled with suitable food and sought my favorite haunts—the Bronx River and the woodlands. My motives were not wholly altruistic,

Upper right. White-breasted nuthatch, *Setta carolinensis*, creeps downward in search of insects and their eggs.

Lower right. Black-capped chickadee, *Parus atricapillus*, perches on a reed rising above a blanket of snow.

Lower left. Several days later the same reed held a tufted titmouse, *Parus bicolor*.

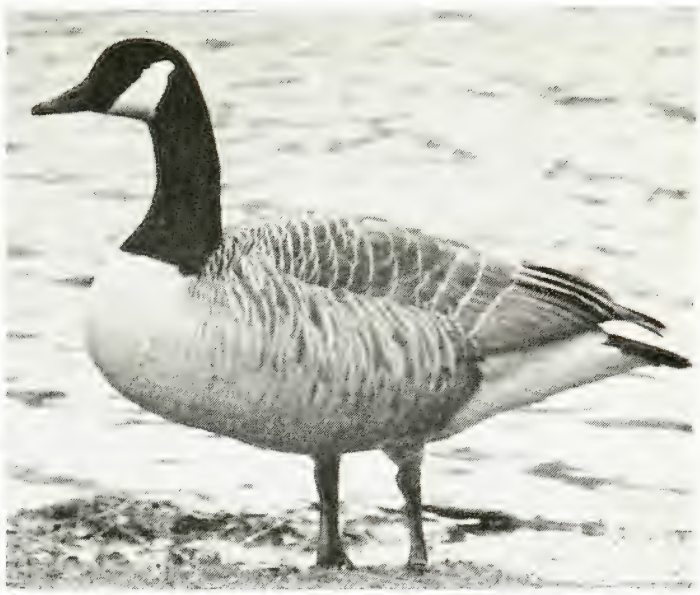
however, for I wanted to observe the behavior and to photograph whatever animals were abroad.

I saw the footprints of a cotton-tail leading into the woods, those of a squirrel ending at the base of a tree. The eastern cottontail rabbit *(Sylviagus floridanus)* is a very common species—and plentiful, since the average litter contains up to five babies, and there are several litters a year. Nature photographers are sometimes hard-pressed to obtain a picture of these lively little mammals. I came upon the one illustrated in these pages, as he dozed in the sun near the Service Building. Rabbits have long since learned to be wary of humans, so it is not easy to get close to them. A long telephoto lens (300 mm.) was used to obtain the picture shown in these pages.

Then I heard the joyful greeting of chickadee, crow, tufted titmouse, junco, and sparrow. I scattered some peanuts and bits of suet around a single reed rising above the snow, and shortly the birds came to feed.

A black-capped chickadee *(Parus atricapillus)*, perhaps the friendliest of our birds, perched on my finger to snatch a bit of peanut. I set up my camera, focusing it on the reed around which I placed more food, and waited. Soon a chickadee perched on the reed. He appeared to concentrate on the procurement of food and showed no apprehension of predatory animals. I was so fascinated by this lovely little creature, I almost forgot to trip the shutter.

A short time later on a beautiful morning not quite so cold, I visited this identical spot, and as soon as I began to disperse the food, squirrels and birds arrived—sparrows, blue jays, chickadees, but no tufted titmouse *(Parus bicolor)*. One, however, was flying in the vicinity and so in order to draw it near, I placed my lips against the back of my hand and made a kissing sound. This sound usually

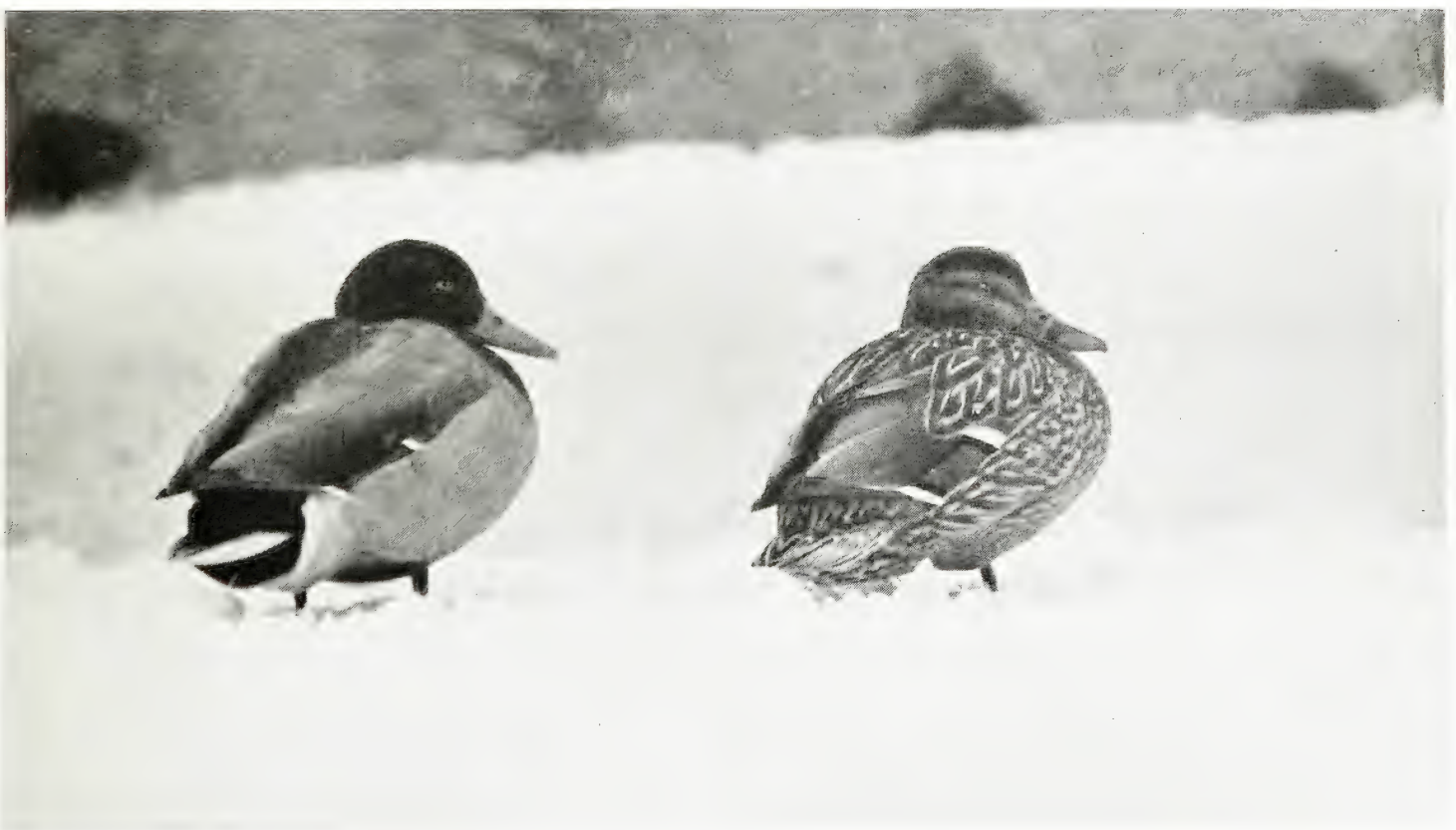


Canada goose, *Branta canadensis*, is soon only occasionally in the Garden.

arouses the curiosity of titmice, inducing them to investigate. The tufted titmouse flew in, perched on the very reed on which I had previously photographed the chickadee, until the camera clicked.

Some days elapsed before my next visit to the Garden; March was upon us with its capricious weather. The early morning was clear, with the light from a pale winter sun diffused by a ground haze. While tossing food to birds and squirrels, my eyes were attracted by movement on the limb of a tree on which rested a cardinal *(Richmondena cardinalis)*, brilliant in his red plumage; perfect for a long telephoto shot.

Mallard ducks, *Anas platyrhynches*, male and female, pull in their wings as snowflakes continue to fall.



The sky darkened, soon snow was falling. Heading homeward, I walked along the bank of the river toward the stone bridge; and as I rounded a turn in the trail, I met a pair of mallard ducks *(Anas platyrhynchos)*. Perhaps it was the storm and the cold which immobolized them, for they made no attempt to depart when I approached to take their photograph.

The Canada goose *(Branta canadensis)* is seen only occasionally in the Garden. I do not know why it is not seen more frequently, because it is plentiful elsewhere in New York City. On the Bronx River north of the City, many congregate the year round. The Canada goose, whose portrait is reproduced here, was found about two years ago, standing on the river's bank not far from the stone bridge. I walked within ten feet of him to take the photograph.

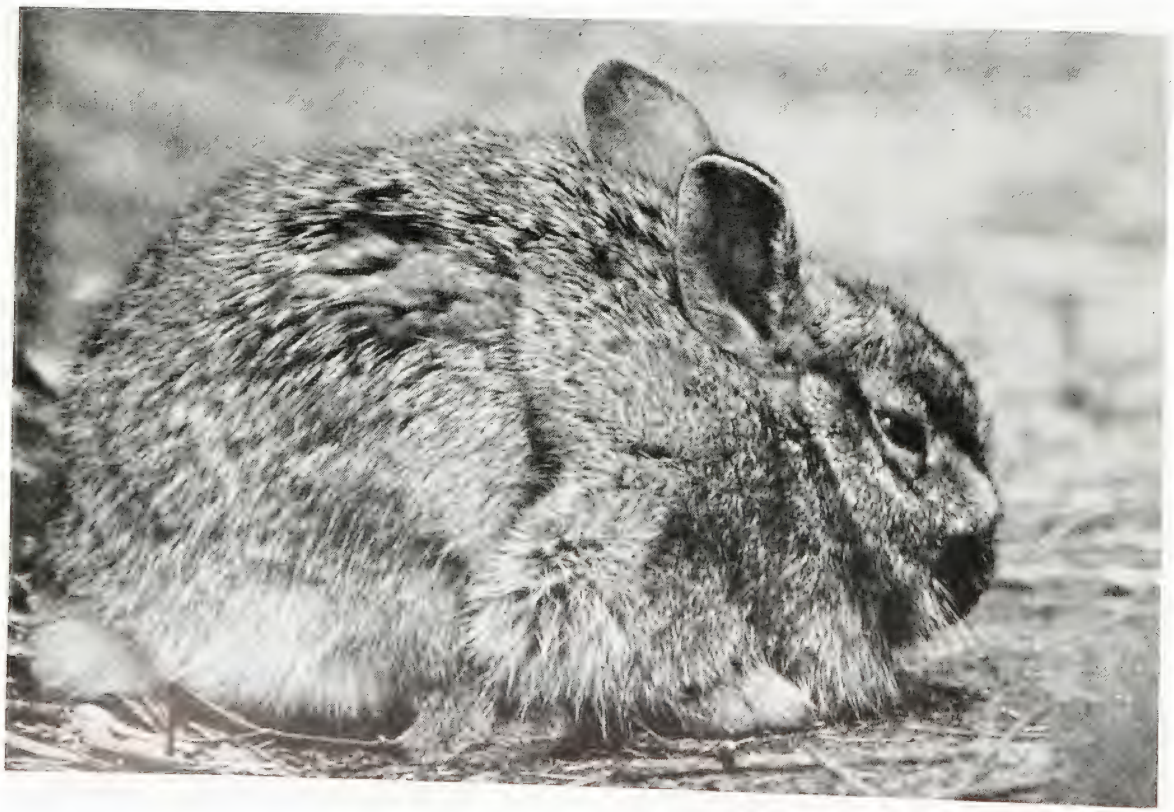
During winter when the trees and shrubs are bare, birds are more easily seen and photographed as they perch on the branches. There is no shortage of winter bird residents in the Garden, among which owls and sparrow hawks may be seen occasionally, and of particular interest are the white breasted nuthatch *(Sitta carolinensis cookei)* and sparrow hawk *(Falco sparverius)* or kestrel.

The white-breasted nuthatch (five to six inches in length) is often a winter visitor to feeding trays from which it will eat nutmeats, sunflower seeds, and suet. It has the interesting characteristic of climbing incessantly and is especially noted for the ability to creep head downward on tree trunks in search of insects and their eggs, spiders, beetles, and ants.

The sparrow hawk (nine inches long), the most familiar of American falcons, is apparently in plentiful supply. Probably because it is harmless, man has not directed his vengeance against the sparrow hawk as he has against its larger relatives. In seeking food, this bird favors an elevated perch bordering cultivated fields or other open ground where it can watch for prey and, when the prey is sighted, flies out to seize it. The sparrow hawk eats grasshoppers, mice, lizards, frogs, and so on, and it will destroy sparrows and starlings. It is not uncommon in The New York Botanical Garden, but since it is only about the size of the robin, one must look closely for it.

Eastern sparrow hawk, *Falco sparverius*, the most familiar of American falcons.

(To be continued)



Cottontail rabbit, *Sylvilagus floridanus*, is not easily photographed at a close distance.

CONVERSATIONS ON ECOLOGY VII

A series of letters bearing on the topic Vegetation Management was inaugurated in the January-February, 1963, number of *The Garden Journal* by Dr. Pierre Dansereau. This correspondence has involved four contributors so far and has raised so many issues that it was found worth while to continue on the same topic in 1964. Dr. Peter Wardle, of the Botany Division of the Department of Scientific and Industrial Research, in Christchurch, herewith gives an outline of vegetation management in New Zealand. A recent visiting scholar to this country, Dr. Wardle has been in a position to compare the adjustment of vegetation to the harsh, continental, high altitudes of Colorado with the mild, oceanic, alpine environment of his country where he has done a great deal of valuable research.

Botany Division,
Department of Scientific
and Industrial Research,
Private Bag,
Christchurch, New Zealand,
November 1, 1963.

Dear Pierre,

Many thanks for your kind invitation to join in your "conversation." I shall leave discussion of ecological aims, principles, and philosophy to your more experienced contributors, for I prefer, and I think you intend me, to consider facets of applied ecology which are characteristic of the New Zealand setting. In New Zealand, as in few other places, man has brought very different floras and faunas abruptly together. On one hand, there is the native biota, evolved during sixty million years of isolation, highly adapted, specialized, and including many archaic survivors (note *Tmesipteris* and *Sphenodon*). This biota includes forms which can be exploited by man, such as timber trees and game birds, but there are few plants and animals which seem suitable material for cultivation or domestication. On the other hand, there is the vast assortment of plants and animals which man has gathered around him, deliberately or accidentally, during some five thousand years of developing civilization. What ecological lessons, and what problems, arise from this confrontation?

It all began, in a relatively small way, when the Maoris reached New Zealand about one thousand years ago. They introduced only a few plants and animals, since, obviously, only a few could survive transplantation from tropical Polynesia. Even their most successful crop, sweet potato, could be grown only under the most benign conditions; hence their agriculture wrought little disturbance. Two animals, the rat and the dog, were successfully naturalized (though both since have been supplanted by European kinds), and these may well have initiated the decline of many indigenous birds, which continues to this day. The Maoris also started extensive fires, and in so far as this was intentional, it was to extend the range of bracken, which has edible rhizomes, and probably also to overcome *moa,* the giant flightless birds which they exterminated. Altogether, they destroyed something like a third of the primeval forest and caused its replacement by grass, fern, and scrub, a historical event not without bearing on vegetation management today.

The confrontation became acute with the arrival of European settlers from the early nineteenth century onwards, with their unlimited recourse to foreign plants and animals, and their ever-increasing power to modify and destroy the biota and even the landscape itself. Today, a visitor can travel the length of the country and see little of native vegetation; lush pastures of European grasses and plantations of North American conifers predominate in the settled areas. Yet, in fact, native vegetation, showing every degree of modification, occupies two-thirds of the area of New Zealand. Let us look at some examples of vegetation, beginning with the lush pastures just mentioned.

Some forms of cropping—for example, pineapple farming in Hawaii—have reached a degree of technical perfection, by which a sequence of carefully planned operations leads to a highly predictable yield. In pastoral farming, where production of plant material is merely an intermediate step, such perfection has never been attained. But it is closely approached with *improved pastures* in New Zealand. These are grass-clover mixtures established on land supporting, before improvement, usually only poor pasture or weed growth, but brought to a high level of fertility through skillful management. Clover supplies the community with nitrogen, but artificial manures are also required, especially calcium "superphosphate" to supply the special demands of clover for phosphorus and sulphur, and lime to maintain suitable chemical and microbial balance in the soil. If livestock shows sickness because of shortage of certain trace elements—usually cobalt or selenium—these, too, are supplied. Destructive root-feeding larvae have been controlled by insecticides, but (echoes of *Silent Spring*) the use of these chemicals is now under review. Cattle and sheep not only supply the economic end-products of meat, wool, milk, and hides, but play an essential role in maintaining the high productivity of the system in that they return nutrients in excreta and graze off top growth of grasses which otherwise would intercept light and induce stagnation.

Indigenous plants play no part in improved pasture. This is in contrast to vast areas of less fertile or hilly land, where settlers sought to burn native vegetation of forest, scrub, or fern, and to establish "English" grasses in the ashes. Instead, weeds took over, the most successful being the native *manuka* shrub and bracken, together with adventives like blackberry, gorse, and the Australian *Hakea.* Some of this land has been abandoned to revert to forest, and some is being converted to high-quality pasture through intensive farming techniques. But most is repeatedly burned and maintained as lean pasture in which manuka and bracken persist, by virtue of the former's fire-resistant seed capsules and the latter's deep-lying rhizomes. Some eighteen years ago a lethal scale insect, probably self-introduced from Australia, began to kill large areas of manuka. This event was regarded with considerable glee by many pastoralists, but not by those who recognize the important role of manuka in soil conservation, nor by foresters who value it as a nurse to forest tree seedlings. However, manuka seems more fortunate than the American chestnut, for young shrubs survive

long enough in blighted areas to produce seed, and an immunity may well eventually develop.

Spread over the mountains and valleys of the eastern side of the South Island, in the rain shadow of the Southern Alps, are the "high country sheep stations." These are the cultural equivalent of the American cattle ranch and are likewise dependent on native grasslands. When graziers first occupied the area in the 1850's, they found that the dominant grasses were unpalatable tussocks, and the vegetation difficult for sheep to penetrate. So they resorted to burning, in order to induce accessible, fresh, young growth. This reduced the vigour of the tussocks, and in the driest areas they succumbed altogether to be replaced by desert. Elsewhere, moderately palatable adventive species, such as bentgrasses and sweet vernal, along with unpalatable native species, formed swards between the remaining tussocks to give rather stable vegetation of mixed ancestry.

Finally, what of the New Zealand wilderness—the "subtropical" forests with tree-ferns, lianes, glossy-leaved evergreens, and stately conifers, the forests of evergreen beeches, the impenetrable mountain scrub, and the alpine grasslands and herbfields? To the inexperienced eye this is pristine vegetation, but in fact nearly all is modified. Much has been modified by man, especially where the giant *kauri* and other conifers have been logged and the jungle understory left to dominate the forest. Far more extensive is the damage caused by multitudes of introduced herbivores—deer, goat, chamois, hare, Australian opossum, pig, and more locally, wallaby and thar. The impact of these animals on vegetation which has evolved in the absence of mammals raises acute and complex biological problems. For instance, while some communities seem almost immune to damage, others, including some forest and scrub communities which are virtually impenetrable in their virgin state, can be destroyed completely and replaced by erosion scars. The types of damage caused by, say, red deer and opossum are quite different, but different again and far more disastrous is the damage caused when both animals occupy the same area of forest. Certain forms of natural disaster, such as those due to insect epidemics or "wind-throw" of forest, acquire different significance when herbivores destroy the seedlings which normally would repair the damage.

Added to biological problems, such as those posed by the preceding examples, are others which might be termed sociological. On one hand, there are many people who prize the vegetation of the wilderness as a scenic, aesthetic, or scientific asset, at all costs to be maintained in its primeval state. Diametrically opposed are those for whom the most important consideration is the sport afforded by the feral animals. Caught between these extremes, and with special problems such as watershed management, are those who must administer the "unoccupied lands"—chiefly state forest and national parks. How they must envy their American counterparts, Pierre, whose aim of *multiple use*—grazing, recreation, watershed management, forestry, preservation of nature, etc.—seem so much easier to achieve with vegetation which has evolved along with browsing animals and their predators.

Best wishes,
Peter

Kalendarium Hortense (Continued from page 6)

arately in many editions. The tenth or last edition of *Kalendarium Hortense* appeared in 1706 and was not brought into print again until this past year. A facsimile reproduction of the little, 4½ x 6½-inch, 224-page book has been published and printed by Philip W. Foster of The Herb Grower Press. It is done on rag paper, bound in brown simulated morocco wtih botanical print end-papers and gold stamping on the cover. The binding has been done by hand by the old firm which bound many of Mark Twain's books when he lived in Hartford, Connecticut. The 485-numbered copies bring to life the wisdom of one of the seventeenth century's great gardeners.

John Evelyn has been credited with being the first to use the word "greenhouse" in his *Kalendarium Hortense*. The description and sketches of a hot-air furnace for heating a greenhouse or conservatory are probably the first ever published. Very down to earth in his instructions for monthly chores in the garden, Evelyn indulges in some flowery terms for many situations. The flower garden is the "coronary" garden, the herb beds he calls "olitory garden," and even manure or dung is "letation."

The fruit trees set against the wall are "mural" trees, and the nursery beds are the "seminary." The "kitchin-garden" includes those things which are "olitary, acetary and salads." Protection in winter is "hymenation" for the plants, while clearing an area of moss is "emuscation." Stripping a tree of leaves and boughs is "frondation," and the one who prunes the trees is the "arborator" who does the "amputation."

This only adds charm to reading the book in the original type style of the seventeenth century, which the facsimile edition preserves. While the notes for each month may have to be moved along, according to the part of the country in which the reader lives, there are many which can be applied today without improvement. For example, for May, Evelyn says: "Now forasmuch as Gentlemen are very inquisitive, when were the best and securest Seasons for exposing their Orange-trees, and more tender Curiosities: I give them this for a Rule the most infallible; That they observe the Mulberry-tree, when it begins to put forth and open the Leaves (be it earlier or later) bring your Oranges & boldly out of the Conservatory; 'tis your only Season to Transplant and Remove them."

In his introduction, John Evelyn observes:
"A Gard'ner's Work is never at an end; it begins with the Year, and continues to the next; He prepares the Ground, and then he sows it; after that he plants, and then he gathers the Fruits; But in all the intermedial spaces he is careful to dress it; so as Columella, speaking of this continual Assiduity, tells us, a Gard'ner is not only to reckon upon the loss of bare twelve Hours, but of a whole Year, unless he immediately set about doing that which ought to be done that very instant:"

Lo! in the middle of the wood,
The folded leaf is woo'd from out the bud
With winds upon the branch, and there
Grows green and broad, and takes no care,
Sun-steep'd at noon, and in the moon
Nightly dew-fed; and turning yellow
Falls, and floats adown the air.

TENNYSON

The circle planting in the new rose garden as it appeared this past June. The Azalea Court road is in the background.

SARAH P. DUKE GARDENS

By Dorothy Ebel Hansell

SOMETIMES A DEVIATION from a planned itinerary brings unexpected pleasure. So it was when, unable to find the prescribed route number, my husband and I decided to follow one in the direction of Raleigh, North Carolina. It led us into the heart of this attractive southern city late on Sunday afternoon, March 31, 1963, the very day on which "open house" was being held in the State Legislative Building. We were greatly impressed by the beauty of this new structure, which harmonizes with the classical lines of the Capitol and the modern architecture of other governmental buildings around it, and is unique among government buildings in this country. Architect Edward Durrell Stone of New York, who designed the United State Embassy at New Delhi, created the distinctive design of the State Legislative Building in association with Holloway-Reeves of Raleigh.

We were equally impressed by the many dogwoods—North Carolina's state flower—magnolias, cherries, redbuds, camellias, and azaleas right in the center of the city—not only on home properties but along the main thoroughfares. Some plantings here, as elsewhere in the South, showed the ill effects of the severe winter, but there was still much to admire, and we could visualize how lovely spring would be in Raleigh after a normal winter.

The change in the route gave us another bonus—the opportunity to visit the beautiful Sarah P. Duke Gardens in Durham, whose unusual design and distinction in planting I had heard commended many times. As I knew three of the landscape architects involved in their development, I felt a strong personal interest in and joy at the prospect of viewing the gardens with my own eyes.

It was thirty years ago that the late Dr. F. M. Hanes of Duke Hospital was inspired with the idea of creating a public garden in the long, narrow valley in the eastern section of Duke University campus. This valley is partly surrounded by a pine forest, partly by maples, oaks, sweet gum, dogwood, redbud, and other native trees. Dr. Hanes enlisted the interest and generous support of Sarah P. Duke, widow of B. N. Duke, one of the benefactors of the University, and was able to engage the services of John C. Wister, landscape architect and horticulturist of Philadelphia, to draw up plans for a garden in which irises would be featured.

The project was started in June, 1934, and trees, shrubs, and spring bulbs, as well as irises, were planted. Unfortunately, the irises did not thrive, and so for a number of years they were confined to a small section. Then, in 1958, they were moved to another location nearer Duke Hospital (which is on the campus) and planted in borders around an oval-shaped greensward which is enhanced by dogwood and evergreen shrubs. Precautionary measures were taken to forestall the occurrence of bacterial soft rot, which caused the previous difficulty.

In the spring of 1937, a formal terraced garden was developed, Mary Duke Biddle financing the construction as a memorial to her mother, Sarah P. Duke. The late Ellen Shipman, landscape architect of New York, designed this garden which consists of seven curved terraces supported by

The seven curved terraces viewed from the slope on the opposite side of the water-lily pond.

Close-up of part of the broad path that serves as the main axis of the terraced garden in the Sarah P. Duke Gardens.

dry rock walls, each wall approximately one hundred and fifty feet long and thirty inches high. A path runs the length of each terrace, both sides of which are planted for succession of bloom from spring through fall; narcissi, tulips, pansies, and early-flowering perennials filled the beds at the time of our visit. A broad path serves as the main axis, extending from the wisteria-draped pergola at the top of the garden to a placid water-lily pond at the bottom. Japanese cherries and crab-apples are planted at regular intervals to emphasize the terraced construction. Boxwood encloses the uppermost level, hemlock the slopes, and beyond these hedges are superb specimens of the southern magnolia or bull bay *(M. grandiflora)*.

A cherry tree, a redbud, a southern magnolia grouped together; a dogwood next to a southern magnolia—such placement provides striking contrast in form and texture and color, revealing the artistry of fine landscape architects. Noticeable, too, is the spacing between such trees, for they were planted with recognition of their size at maturity.

Beyond the pond, on the east-facing slope opposite the formal terraced garden, is the rock garden that was designed by the late Frederic H. Leubuscher, landscape architect. Some readers of *The Garden Journal* may recall the spectacular rock gardens he displayed at International Flower Shows, when held in the Grand Central Palace, New York, or may have seen the extensive rock garden at his home in Essex Fells, New Jersey.

The east-facing slope, on which the rock garden is located, viewed from the central axis of the terraced garden.

A major program of expansion of the Sarah P. Duke Gardens is under way. We parked our car in the new parking lot; entered the formal entrance, recently constructed and then being planted; and continued through the new rose garden situated in an open section (deliberately chosen to mitigate the problem of black spot) and laid out in geometrical patterns. Planting was just beginning, delayed by the severity of the winter. From this open area we entered a woodland in which we noticed azaleas had been recently and were still being planted. On inquiry, we were told that this is the new azalea court; we later learned our informant was Benjamin E. Kirkland, Assistant Horticulturist.

The new parking lot, the formal entrance, the rose garden, the azalea court, the replanting of the Hanes Memorial Iris Garden are incorporated in the master plan prepared in 1958 by W. B. S. Leong, landscape architect of Andover, Massachusetts, for the Department of Botany of Duke University and approved by the Trustees of the University. Financial support for various important projects has been generously granted by the Mary Duke Biddle Foundation. Mr. Leong has been retained as planning consultant to assist in the implementation of the plan. Thus the fifty acres comprising the Gardens will be improved within the next several years, the established gardens being retained and refurbished and new features introduced. While the emphasis will remain on plants and flowers, other forms of garden embellishment, such as the modern gates and screens created by Joseph G. Barnes of Leverett, Massachusetts, will be included in appropriate locations.

The Gardens are under the supervision of the Department of Botany, with Prof. Paul J. Kramer their Director. Richard H. Fillmore, who had been Horticulturist since 1956, was appointed Associate Director in 1963. He came to the Duke Gardens from Ohio State University.

The Sarah P. Duke Gardens have three objectives: to provide a collection of plants for the enjoyment of the University community and the general public; to serve as a practical demonstration of the kinds of plants that will grow here; and to serve as a trial ground for new plants and new cultural methods suitable to gardens in the area. They are open every day in the year from eight o'clock in the morning until sunset, without charge.

The modern gate that marks the entrance from the parking lot to the new rose garden.

Supplementing the notes that the Editor gathered during her visit to the Garden were the notes on their history furnished by Prof. Paul J. Kramer and Richard H. Fillmore. Information on the master plan was obtained from Mr. Fillmore and from the article, "University Gardens: A Developmental Plan," written by William B. S. Leong for *Landscape Architecture,* autumn, 1959.

American Gentians (Continued from page 17)

Gentiana *(romanzovii) algida* is a northwestern and Alaskan species, and found in Siberia and Japan. I have grown this gentian from seed, its flowers were a rather soiled white. Mrs. Strutz furnished a slide as it grows in Alaska—a stout plant with large vase-shaped flowers, white inside and straw-yellow outside, streaked with blue. But the plant is still not attractive in my opinion. The flowers have a snipped papery appearance, and the upper portion of the petals unbecoming brown streaks as the flowers begin to fade.

THE FRIENDSHIP GARDENS

Work in a Women's Prison

By Georgina Van Rensselaer

Mrs. (Cortlandt S.) Van Rensselaer is a member of the Bedford Garden Club, a member club of The New York Botanical Garden.

Westfield State Farm, the New York State Prison for Women, lies in Bedford Township, Westchester County, and to it are sent all major offenders, including "lifers" for murder. It is called a medium security prison, a term which classifies the type of wall which surrounds it and the number of officers for each inmate. Sing Sing, for example, is a maximum security prison.

The work of the Bedford Garden Club with the women of Westfield State Prison Farm began many years ago under the inspiring guidance of our beloved member, the late Eloise P. Luquer. She went alone to the prison and in January, 1938, organized The Cooperative Garden Club on the Hill. Miss Luquer wrote and illustrated botanical notebooks for the inmates, showed her water colors of wild flowers to them, and gave many talks at the reformatory as well as at the prison.

Before her first lecture, the Correction Officer turned to Miss Luquer and said, "I hope you won't mind, the women are quite apt to throw things at the speaker." But, instead, they listened attentively to Miss Luquer's talks, as she spoke in her inspiring way of the wonders of the universe, and opened their eyes to the beauty of the small things in the world around them.

After Miss Luquer's death the women at Westfield State Farm were left strictly alone by the outside world, except for presents provided by the Scarsdale Women's Club. In 1957, one of our members, Mrs. Emerson Conner, (then, Mrs. Neeley Hilbert) who was working at the prison, became interested in the tragic problems of the prisoners. As a result, the late Mrs. Arthur Anderson, then President of the Bedford Garden Club, and Mrs. Anna C. Kramer, then Superintendent of the prison, conceived the idea of gardens for the inmates. They felt the therapeutic value of working with one's hands in the earth, of watching seedlings grow and of harvesting crops, would be of inestimable aid in rebuilding the inmates' morale.

Mrs. Kramer urged Mrs. Anderson to sponsor a prison garden club, and Mrs. Anderson did her utmost to promote the project.

A Bedford Garden Club Prison Committee was formed and met with Mrs. Kramer and several of the prospective gardeners at a tea. The proposed work was cleared with Albany, and the Commissioner of the Department of Correction graciously granted a carte blanche to the members of the Bedford Garden Club to admit them to Westfield State Farm and to commence the project. Questionnaires were sent to the prisoners, and seventy-two signed up. Twenty-four garden plots were marked out and allocated, and on April 27, 1958, seeds and seedlings were distributed and the work started.

It was hard to believe that any ground could hold so many rocks and weeds as the new gardens. When these were removed, the back-breaking tasks of plowing, sowing, and watering began. There have, of course, been many ups and downs; periods of despair when rabbits, rodents, and other pests have taken over; the usual gardener's complaints of weather, lack of rain or sunshine, but all in all the project has been fruitful and rewarding. The Friendship Garden Club was most aptly named—the relationship between the dedicated members of the Bedford Garden Club, the Prison Committee, who give an afternoon a week throughout the year, and the inmates, has been a most happy one.

A yearly program starts in the spring, when the gardens are spaded and seeds distributed. Each gardener designates her choice of seeds, lists are made, packets collected for each gardener, and later seedlings are given out.

In May, an anniversary party is given for the members of the Friendship Garden Club. Invocations are offered by the Rabbi and the Roman Catholic and Protestant Chaplains. The Superintendent gives a short speech of welcome and expresses her gratitude to the members of the Bedford Garden Club for their continued interest in the women of the prison. Mrs. Richard Hollyday, for many years the Chairman of the Friendship Gardens for the Bedford Garden Club, always expresses the Committee's pride in the accomplishments of the gardeners and appreciation of the good fellowship demonstrated by their cooperative work. Entertainment follows by the talented members of the Friendship Garden Club—this may consist of musical numbers, community singing, dances, or poetry recitations—before refreshments are served.

In June, when the gardens are well under way, a ceremony, "the Blessing of the Gardens," takes place. The Chaplain of Westfield Farms, the Rev. Baker, heads the procession and is followed by the gardeners singing a psalm. Each garden is blessed as the procession winds about them.

During the summer months the women start reaping the rewards for their hard work—the joy derived from the fruition of their labors, the satisfaction of growing their vegetables, and the pleasure of eating their own produce.

The Harvest Show in September is a gala occasion, entailing more hard work. The display of vegetables and flowers and artistic arrangements are the culmination of the gardeners' efforts. Before the great day of the show, Mrs.

The St. Francis Garden at Westfield State Farm.

Paul Sturtevant and other talented flower arrangers demonstrate their art, and the women in the prison take great pride in emulating them. Flowers for the chapel altar are demonstrated in pairs of tall vases; arrangements for dining room tables, miniature arrangements, and corsages are displayed on tables, all making a very gay scene. Innumerable prizes are given, for arrangements and for the quality of vegetables; and the gardens, too, are judged and ribbons given for excellence. Rewards are also presented in the "Garden Poster Contest" and "Essay or Poem Contest." Many of the essays are touching in their gratitude, expressing the deep satisfaction gardening has given.

In the autumn, after the gardens have been put to bed and outdoor work is no longer possible, the Committee continues going to the prison to give talks, show slides, read on garden subjects, and to demonstrate winter arrangements.

Decorations are made for Thanksgiving, and at Christmas wreaths are fashioned. The holiday season is a particularly lonely time for the women at Westfield State Farm, and their joy in cutting fresh greens and preparing Christmas decorations, while singing carols, is one of the most satisfying outlets they experience.

In the winter months work is carried on in small groups —seed catalogues are obtained, garden scrapbooks are made, winter arrangements studied, bulbs planted in dishes, and house plants given constant care.

There have been times of heartache—when women have been deprived of the privilege of their gardens as punishment, or when garden prizes awaiting presentation have mysteriously disappeared and mysteriously reappeared under threats of dire punishments. There have been many moments of laughter—when it was discovered that some of the women were burying bottled fruit juice in the hope of harvesting more palatable and potent beverages, or when a new inmate referred to her "short time on the campus." Mostly, however, it has been a work of devotion and has been received as such. The deep satisfaction of the members of the Bedford Garden Club lies in the fact that there are now 194 gardeners and 129 gardens, a great increase since the project was started almost six years ago. The prison grounds are greatly improved and beautified by the many flowers blooming along the stark walls of the buildings. We hope that in some way we are helping to rebuild shattered lives and that our interest in the members of the Friendship Garden Club will lift their morale. If we have succeeded, it is wholly due to Mrs. Richard Hollyday, our past Chairman, and Mrs. Robert FitzGibbon, our present Chairman, and to the aid and encouragement we have received from the Superintendent, Mrs. Lillian V. Fish, and the entire staff at Westfield State Farm.

Fruits and Vegetables of Hawaii (Continued from page 14)

pork. A delicious jam is prepared from the *poha,* a kind of ground-cherry *(Physalis peruviana),* a perennial herb sometimes found growing wild in Hawaii. The berry develops in a papery sack, and a thin, orange skin covers its sweet, juicy, seedy pulp. It is eaten raw or cooked and is also prepared commercially for jam and jelly. The black nightshade *(Solanum nigrum)* is a cosmopolitan, weedy, small herb which is greatly valued medicinally by Hawaiians. Young plants are also eaten as greens. Eggplants are a common vegetable, the fruits ranging from globose to ovoid, to long and narrow. Green and red peppers, potatoes, and tomatoes yield well in Hawaii; the currant-tomato *(Lycopersicon pimpinellifolium)* is a wild plant.

The cosmopolitan, broad-leaved plantain *(Plantago major)* is a weed in Hawaii, where it is called *laukahi* and is used medicinally, both internally and externally.

The Madder Family, *Rubiaceae,* includes a tree which produces a valuable commercial product, coffee. Plants of *Coffea arabica,* a native of tropical Africa, were first brought to Hawaii in 1813. The quality of Hawaiian Kona coffee is excellent. In comparison with the sugar and pineapple industries, the coffee industry has fluctuated, sometimes ranking second to sugar and sometimes third to pineapple. One of the biggest yields was in 1930, when more than eight million pounds were exported to the mainland. Related to coffee is a small tree with large, ovate leaves, the *noni (Morinda citrifolia);* it bears ovoid fruits somewhat like small breadfruits. Hawaiians value the plant for its products, which include dyes and medicine.

The Gourd Family, *Cucurbitaceae,* is noted for its many food plants, and melons, cucumbers, squashes, and pumpkins have long been grown in Hawaii. The bitter melon *(Momordica charantia)* was brought from the Eastern Hemisphere: though bitter, the knobby fruits, about eight inches long, are eaten when green, cooked or stuffed with meat;

Some of the rows of vegetables carefully tended by the Friendship Garden Club at Westfield State Farm.

and the leaves and shoots of this vine are cooked as greens. Another bitter-tasting vegetable is the dishcloth gourd *(Luffa acutangula),* borne on an annual vine from India. It is narrow-oblong, eight to twenty-four inches long, ten-ridged, green outside and white inside. This gourd is sliced as an ingredient of chop suey; the shoots, young leaves, and flowers are eaten as greens.

The Chinese preserving melon *(Benincasa hispida)* from tropical Asia is globose or oblong, when ripe weighing up to forty pounds, green, waxy, and hairy outside, white inside. Orientals cook pieces of the ripe fruit with other vegetables and meat, as well as the small unripe fruit. The Oriental pickling melon *(Cucumis melo* var. *conomon)* has fruit similar to that of the cucumber, but the skin is white or yellow-green; it is cooked in soup. The fruit of the white-flowered gourd *(Lagenaria siceraria),* a native of tropical Asia or Africa, is smooth, green and mottled or white, and of various shapes: globose, club-shaped or twisted, long or short, thin- or thick-shelled. One form grown for food is picked while green and added to soup or mixed with meat. Hawaiians formerly used gourds as receptacles for water, food, and tapa, and also as drums and dance rattles.

The Daisy Family, *Compositae,* includes many useful vegetables, such as lettuce, artichokes, dandelion greens, endive, salsify. Perhaps new to Westerners is the use for tea of the Spanish needle *(Bidens pilosa),* a tropical American annual, as well as native species of *Bidens,* all called *ko'oko'olau* by Hawaiians. Also new to Westerners may be the use of the butter-bur *(Petasites),* a large herb from an island of Japan. The plant is rosette-shaped, and its large, round leaf-blades are borne on succulent leaf-stems, one to three feet long. These stems are cooked and added to soup stock. Orientals flavor rice and color it green with *Artemisia vulgaris,* an aromatic European herb. They cultivate the burdock, or gobo *(Arctium lappa),* a tall herb from Eurasia, for its long, narrow root, up to two feet by one inch. After boiling the root, they sometimes serve it with ground-up sesame seeds and soy sauce. And the seedlings and young shoots of the garland chrysanthemum or crown daisy *(Chrysanthemum coronarium)* are served as greens, *shingiku.*

Above. Early view of the shore line to the north from the lawn at Mount Vernon, as executed by Latrobe in 1796.

At right. The view today from nearly the same location.

NEWS, NOTES and COMMENTS

The Citizens Committee on Natural Resources in its "A Progress Report" on Mount Vernon, as of October, 1963, states that:

"In 1961 Congress passed an act, which was signed into law by the President, to preserve for all time, for all the people of the nation, the view which was enjoyed by George Washington.

"In 1962 Congress appropriated money for the first parcel of land and the Accokeek Foundation donated to the Government 155 acres—the first of several intended donations. Scenic easements have been donated on more than 70 tracts of land within the area designated for preserva-

tion; these are contingent on completion of the project as authorized by Congress.

"In January 1963 President Kennedy requested Congress to appropriate the balance of the amount authorized, $724,000. On March 28, 1963, the Subcommittee on Interior of the House Appropriations Committee 'disallowed' this item in the budget. The Senate restored it. On July 11, 1963, the House prevailed over the Senate in conference committee, thus eliminating funds for the project in the current fiscal year."

Dr. Ira N. Gabrielson, Chairman of the Citizens Committee on Natural Resources, appeals to all interested citizens to write or phone their Senators and Representatives, urging them to appropriate the balance of the amount authorized two years ago.

Mrs. Rosamond P. Beirne, Regent of the Mount Vernon Ladies' Association adds, ". . . there is a national purpose to preserve this unspoiled natural setting. *This is not a local* responsibility . . ."

GEORGE WASHINGTON MEM. PKWY.
MOUNT VERNON
FORT WASHINGTON
(FEDERAL PARK PROPERTY)
MOCKLEY POINT
POTOMAC RIVER
PISCATAWAY BAY
MARSHALL HALL
N
LAND FOR WHICH FUNDS WERE APPROPRIATED BY CONGRESS - 1962
LANDS DONATED TO INTERIOR DEPT. BY TWO FOUNDATIONS - 1962-63
FOUNDATION LANDS TO BE DONATED
TO BE PRESERVED BY SCENIC EASEMENTS
OVER 70 EASEMENTS DONATED 1963
CLEAR AREAS ARE UNCOMMITTED PRIVATE LANDS

Symposium on "Creative Writing." Dr. William C. Steere, Director, and Dr. Pierre Dansereau, Assistant Director (Botany), attended the symposium on "Creative Writing," held in Caspary Hall, Rockefeller Institute, on October 29, 1963.

Dr. Detlev W. Bronk, President of Rockefeller Institute, was the chairman for the morning session when Dr. Edward Lurie, Associate Professor of History, Wayne State University, discussed "Creativity and Democratic Values: The Role of Scientific Elites in American Culture"; Dr. Loren C. Eiseley, University Professor of Anthropology and the History of Science, University of Pennsylvania, "The Illusion of the Two Cultures"; and Dr. Bentley Glass, Professor of Biology, The John Hopkins University, "The Critical State of the Critical Review Article."

At the afternoon session, Dr. Oswald Tippo, Executive Dean of Arts and Science, New York University, presided. John Fischer, Editor in Chief of *Harper's Magazine,* spoke on "Scientific Writing for Laymen"; August Heckscher on "Truth and Value"; and Dr. Froelich Rainey, Director of the University Museum, University of Pennsylvania, on "Archaeology, Television, and the Public."

After dinner that evening, Dr. Marjorie Hope Nicolson, a member of the Institute for Advanced Science, addressed the gathering on "Manner or Matter."

Dr. Dansereau spoke on "The Learning Process" at the Markle Symposium, devoted this year to "The Development of the Intellect." The symposium was held at Skytop, Pennsylvania, November 3-6, 1963. Dr. Dansereau has recently been elected a Fellow Member of the World Academy of Art and Sciences.

T. H. Everett, Assistant Director (Horticulture) addressed the Horticultural Society of New York on his Asiatic trip, attracting the largest attendance in the Society's history at any monthly meeting. His talk, accompanied by magnificent slides, held his audience spellbound for an hour and a half.

Dr. Harold William Rickett visited Morris Arboretum, Chestnut Hill, Philadelphia, as guest of its Director, Dr. John M. Fogg, Jr., and Mrs. Fogg. The following day he participated as a guest speaker in "Fall Gardening Day," sponsored by the Pennsylvania Horticultural Society and The Ambler Campus of Temple University, and held on The Ambler Campus, October 17, 1963. Dr. Rickett's subject was "Wild Flowers."

Dr. P. Pirone, Senior Plant Pathologist, addressed the Flushing Garden Club on "What's New in Gardening" this past October.

An Author's Citation was extended to Dr. Pirone by the Executive Committee of the International Shade Tree Conference at its annual meeting in Toronto, Canada, in August 1963. Others selected for a similar award were Dr. Cynthia Westcott, Dr. Donald Wyman, Joseph K. Williamson, and Fred Kilner (posthumous). The official presentations will be made at a later date.

Phil Clark, Assistant to the Director (Public Relations), after bidding farewell to his tour group in Guatemala City, visited the highlands of Quetzaltenango and Huehuetenango, Guatemala, and Chiapas, especially the temperate highlands of San Cristobal de las Cassas and the lowland tropics of Tutla Gutierrez. Mr. Clark was especially impressed with the natural beauty and floral wealth of Chiapas. He collected seeds of a *Cosmos* species, in a pink and a white form, which has not been cultivated. He believes this will be adaptable to garden conditions in this country and may become as popular as the garden forms of *Cosmos bipinnatus.*

Manihot history was uncovered by Dr. David J. Rogers, Curator of Quantitative Taxonomy, during his expedition to Yucatán this past summer. Dr. Rogers came upon evidence which has convinced him that *Manihot esculenta* had been originally cultivated by the Mayans in Yucatán. Previous investigations had credited the Indians of Brazil or Venezuela with the first cultivation of this plant, the source of tapioca. It is also known as casava and manioc, and is a food staple in many tropical areas of the New and Old Worlds. Dr. Rogers' finding will be of interest to archaeologists and agricultural historians as well as to botanists.

Mulford Martin, Honorary Curator of Bryophytes, led a nature walk at Greenbrook Sanctuary in the Palisades for the Palisades Nature Association in November, 1963.

The New York Botanical Garden Expedition to the Wilhelmina Mountains in westcentral Surinam, on which Dr. Bassett Maguire departed June 12, 1963, has been brought to a close. The collection of some twenty-five hundred numbers in over twenty-five thousand specimens were en route by steamship from Surinam at the time of this writing, November 18, 1963.

Participating in the expedition with Dr. Maguire were Dr. Howard Irwin, Associate Curator, Dr. Ghillean T. Prance, Research Fellow, Noel Holmgren, graduate student, all at the Garden; and Dr. Thomas R. Soderstrom of the Smithsonian Institution, Dr. Gerard Wessels-Boer of Utrecht, Holland, and Dr. Jop Schulz of the Forest Department of Surinam. Dr. Howard was expedition leader for the Wilhelmina exploration.

Dr. William C. Steere, Director of The New York Botanical Garden, examines specimens of mosses which he collected at the Arctic Circle last summer, with Dr. David J. Rogers, Curator of Quantitative Taxonomy, an interested observer.

Dr. Maguire and his wife Celia and Dr. J. Murça Pires, Head of the Department of Botany of the University of Brasilia, concluded an overland reconnaisance along the new highway from Belém to the new capitol city Brasilia and westward to Boliver south of Porto Velho on the Rio Madeira, the large upper tributary of the Rio Amazon. The round trip covered some 12,300 kilometers by jeep and supporting trucks. Some of the collection of over twelve thousand numbers has reached the garden, the rest is en route.

Exhibit at World's Fair. The New York Botanical Garden will have an exhibit at the World's Fair illustrating the kinds of vegetation that covered Manhattan about 1650, 1750, 1850, and 1950, and the importance of The New York Botanical Garden in the landscape, and in the cultural, educational, and scientific life of the City throughout these years. Four large panels will contain maps showing the regression of natural vegetation and the increase of urbanization; also prints, photographs, and other articles pertinent to the Garden's contribution in each of the periods.

The exhibit, which is being prepared under the direction of Dr. Pierre Dansereau, Assistant Director (Botany), and Mrs. Charles Burlingham, Honorary Curator of Museum Exhibits, will be displayed with exhibits from other metropolitan museums in the City of New York Building at the World's Fair.

Staff Seminars. At the first staff seminar of the 1963-64 season, Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Botany, reported on the Garden's recent tropical explorations. On December 18, Joseph Morningstar of Morningstar-Paisley, New York, showed a film on "The Story of Tapioca."

"Treasure Hunt in The New York Botanical Garden." Sixty students from the fourth and fifth grades of the Spence School, New York, visited the Conservatory, Herb Garden, and Museum Building the last week of October, 1963. Barbara Colbron, the headmistress, Nene Vidder, head science teacher, and Marian Taggart, head art teacher of this age group, and several other teachers accompanied the children who enjoyed the project.

Teachers had previously visited the Garden and had made a floor plan of the Museum exhibits. Each child was given a leaflet with questions to be answered, relating to the various exhibits.

The "Treasure Hunt in The New York Botanical Garden" was an art and science project of the Spence School.

It might be added that many classes of public school children have been shown these fine exhibits to demonstrate science and nature subjects. On October 28, the day of the Spence School visit, several hundred public school children were in the Museum Building between the hours of 10 a.m. and 12 noon.

National Science Foundation Grants. The New York Botanical Garden has recently received a grant from the National Science Foundation in amount of $6,600 for the support of research under the direction of Dr. Richard M. Klein, Alfred H. Caspary Curator, on "Interaction of Ultraviolet and Visible Radiation on Plant Growth."

Another grant, in amount of $5,000, was awarded the Association for Tropical Biology for support of a meeting to be held at Barro Colorado Island, Canal Zone, under the direction of Dr. Steere, with Dr. Maguire serving as project director.

Visitors to the Garden

Julis M. Haber, Penn. State University, University Park, Pa.

William T. Gillis, Michigan State University, East Lansing.

Dr. R. R. Stewart, Ann Arbor, Mich.

Dr. Tom Morley, Minneapolis, Minn.

Stanley L. Glowenke, Plainfield, N. J.

Dr. James D. Montgomery, Botany Dept., Rutgers The State University, New Brunswick, N. J.

Janet Teys, Botanic Museum and Herbarium, Brisbane, Queensland, Australia.

Dr. José de J. Jiménez, Instituto Botanic, Universidad de Santa Domingo, D. M. Republic.

Shou-heien Huang, Normal University, China, Taipei, Taiwan.

Oscar Chiang, Columbia University, New York, N. Y.

Floyd Conland and William Steel, Norwalk, Conn.

Danko Brncil, Instituto de Biologic, Universidade de Chile, Santiago.

Dr. Bruce R. Voeller, The Rockefeller Institute, New York, N. Y.

Dr. Elizabeth McClintock, California Academy of Science, San Francisco.

Dr. Lyman B. Smith, Smithsonian Institution, Washington, D. C.

Dr. Mario Ricardi, Universidad de Concepcion, Chile.

R. E. Perdue, U. S. Department of Agriculture, Beltsville, Md.

Dr. Gerhard Menke, Institute for Phytopathologie, Giessen, Germany.

Dr. S. Aarons, Queens College, Flushing, New York.

Dr. Y. Kimura, Nippon University, Tokyo, Japan.

Dr. C. A. Salemink, University of Utrecht, Utrecht, Holland.

Dr. N. L. Gross, Columbia University, New York, N. Y.

The American Horticultural Society presented five citations at the eighteenth annual American Horticultural Congress held in St. Louis, Missouri, in October, 1963, as follows, to:

Dr. Lewis C. Chadwick of the Department of Horticulture of Ohio State University, "for over thirty years of service as a teacher and research worker in ornamental horticulture and

(Continued on page 38)

Below and lower right. The Bonsai Exhibit, sponsored by The New York Botanical Garden and the Bonsai Society of Greater New York at the Garden in October, 1963.
Upper right. Yuji Yoshimura prepares a bonsai for the exhibit.

BRIEF NOTES ON RECENT BOOKS

by ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

GENERAL AND SPECIAL GROUPS OF PLANTS AND GARDENS

ALL ABOUT MINIATURE PLANTS AND GARDENS INDOORS AND OUT. Brilmayer, Bernice. 319 pages, bibliography, indexed. Doubleday and Co., Garden City, N. Y. 1963. $4.95.

What is a miniature plant? It seems to me that the author has "stretched" the definition of a true miniature when she includes *Viburnum carlesii, Sciadopitys verticillata,* and *Chaenomeles*—to mention only a few. However, this special group of plants is at present very popular, and there is a lot of good material to be found in this posthumous work.

CARNATIONS. Fenn, Peter Allwood. 94 pages, illustrated, indexed. (Foyles Handbooks) SportShelf, New Rochelle, N. Y. 1963. $1.50.

A concisely written handbook on the cultivation of "annual", "border", and "perpetual" carnations, primarily for British amateur gardeners who have "good light, plenty of fresh air, good drainage, and an adequate supply of lime in the soil." Directions are given for outdoor and greenhouse culture with a chapter on growing for exhibition.

FOLIAGE PLANTS FOR YOUR GARDEN. Bartrum, Douglas. 112 pages, illustrated, indexed. (Foyles Handbooks) SportShelf, New Rochelle, N. Y. 1963. $1.50.

To this British author, the leaves of many plants have a delightful sculptural quality which renders their often insignificant flowers superfluous. He discusses the landscaping value, selection, and culture [for gardening conditions in Great Britain] of foliage plants which include over one hundred different genera.

THE GENERA OF AMARYLLIDACEAE. Traub, Hamilton P. 85 pages, illustrated, indexed. (The Genera of Organisms) American Plant Society, La Jolla, Cal. 1963. Paper, $5.00.

Dr. Traub describes this publication (which he has dedicated to Michel Adanson, "Father of the Amaryllis Family") as a summary based on the unpublished manuscript of "The Species of Amaryllidaceae" which will appear later. Chapter headings include: Brief History of the Amaryllis Family; Family Amaryllidaceae; Delimitation of Genera; Arrangment of the Amaryllid Tribes; Amaryllid Chromosome Numbers; Key to Subfamilies, Infrafamilies, Tribes, Subtribes and Genera; Description of the Subfamilies, Infrafamilies, Tribes, Subtribes and Genera.

THE GLADIOLUS. Genders, Roy. 92 pages, illustrated, indexed. (Foyles Handbooks) SportShelf, New Rochelle, N. Y. 1963. $1.50.

Another addition to the "Foyles Handbooks for Gardeners Series" by the prolific author of practical gardening books for the British amateur. A number of the varieties and pesticides mentioned are not obtainable from American dealers.

GROWING ORCHIDS AT YOUR WINDOWS. Kramer, Jack. 151 pages, illustrated, indexed. D. Van Nostrand Co., Princeton, N. J. 1963. $4.95.

Jack Kramer, a Chicago business man, became interested in growing orchids under average home conditions some nine years ago. He started with two plants and now his collection numbers over one hundred and fifty. The contents of his very practical guide, based on his achievements and his failures, include a considerable amount of excellent detailed information as to descriptions and culture.

MOBILE GARDENING GUIDE. Newcomb, Duane G. 154 pages, illustrated. Trail-R-Club of America, Beverly Hills, Cal. 1963. Paper, $2.95.

Something new in gardening books—a gardening manual for the trailer-camp resident. Emphasis is given to container gardening, hanging baskets, quick-growing annuals, perennials, and bulbs.

THE NEW COMPLETE BOOK OF AFRICAN VIOLETS. Wilson, Helen Van Pelt. 229 pages, illustrated (part colored), indexed. M. Barrows and Co., New York. 1963. $5.95.

Twelve years have passed since the author's *The Complete Book of African Violets* appeared. Mrs. Wilson has thoroughly reworked her original volume and now presents a completely new work, with new illustrations, new varieties, new cultural practices (including fluorescent lighting) and an additional chapter on other gesneriads.

THE PLANTS. Went, Frits W. and The Editors of Life. 194 pages, illustrated (part colored), bibliography, indexed. (Life Nature Library) [Time, Inc., New York] Silver Burdett Co., Morristown, N. J. 1963. $5.24.

A magnificent production by the combined talents of *Life's* staff of editors, designers, photographers, and artists and of Dr. Frits W. Went, Director of the Missouri Botanical Garden who has written a lucid, descriptive text. Our Garden Director, Dr. William C. Steere, pays high tribute to this book when he states in the introduction: "This is no superficial work ... I am sure that many readers, once they have been introduced to botany in these pages, will find themselves with an irrestistible urge to pursue further many of these fascinating bypaths and ramifications of a science that is basic to our world."

WATER PLANTS: A STUDY OF AQUATIC ANGIOSPERMS. Arber, Agnes. 436 pages, illustrated, bibliography, indexed. (Historiae Naturalis Classica Vol. XXIII) Hafner Publishing Co., New York. 1963. $10.00.

A boon to many students and research workers is the reissuing of much-needed out-of-print titles, the original editions of which have become "collectors' items." Agnes Arber's classic has now become available in a fine offset edition which includes a preface containing nomenclatural alterations and biographical notes by William T. Stearn of the Department of Botany of the British Museum (Natural History).

THE WORLD BOOK OF HOUSE PLANTS. McDonald, Elvin. 318 pages, illustrated, bibliography, indexed. The World Publishing Co., Cleveland. 1963. $7.95.

There is a satisfactory quality to this book on indoor gardening. The general format is pleasing, the illustrations, both line drawings and photographs, are good, and the comprehensive text is especially well organized. The first part is devoted to general cultural methods, with ample space given to discussion of pests, propagation, bulb forcing, terrariums, hanging baskets, fluorescent lighting, and numerous other phases of house-plant growing. The second part follows, in encyclopedic form, with specific descriptive and cultural notes. The arrangement is by plant families, but a comprehensive index enables one to locate a plant by its common or by its Latin name. The final part of the book contains a glossary of terms, a good list of recommended books and periodicals, and a directory of commercial sources of plants and supplies.

MISCELLANEOUS GARDEN REFERENCE GUIDES

A GARDENER'S BOOK OF PLANT NAMES: A HANDBOOK OF THE MEANING AND ORIGINS OF PLANT NAMES. Smith, A. W. 428 pages, Harper and Row, New York. 1963. $5.95.

This posthumous publication has been the result of many years of compilation and evaluation. It is a dictionary of scientific and common plant names and botanical definitions (over 4,000 entries). The introductory part is devoted to a simple explanation of plant nomenclature and pronunciation of scientific names, and this is followed by a glossary of botanical terms. In the main body of the work Mr. Smith lists generic and specific names with their derivations, interspersed with historical and legendary information. A useful feature is the index of cross-reference from some 1,800 common plant names to corresponding Latin names. Minor faults of this ambitious work are some omissions and occasional inconsistent space allotments given to different plants.

LIGHTING YOUR HOME. Editorial Staffs of Sunset Magazine and Sunset Books. (A Sunset Book) 96 pages, illustrated. Lane Book Co., Menlo Park, Cal. 1963. Paper, $1.95.

Although the greater part of this very practical lighting manual is concerned with home interiors, there is a section which deals with the lighting of plantings of entryways, patios, garden paths, trees and shrubs.

VEGETABLES

GARDENING FOR HEALTH: AN INTRODUCTION TO THE METHOD OF BIO-DYNAMIC GARDENING INAUGURATED BY RUDOLF STEINER. Philbrick, John and Helen. 93 pages, illustrated. Rudolf Steiner Publications, Blauvelt, N. Y. 1963. $2.95.

The authors are ardent followers of bio-dynamic gardening practices, and in their little book they have outlined typical bio-dynamic methods for growing, harvesting, cooking, and preserving edible fruits and vegetables, with brief mention of flowers and lawns.

A PROFESSOR'S STORY OF HYBRID CORN. Hayes, Herbert K. 237 pages, illustrated,

bibliography, indexed. Burgess Publishing Co., Minneapolis. 1963. $6.50.

Here is an intimate history of the dramatic development through research of hybrid corn, written by one who himself has played no small role in the development of superior varieties, and who has personally known and worked with many of the outstanding plant breeders of this country.

TOMATO RING CULTURE. Flawn, Louis N. 79 pages, illustrated, indexed. (Foyles Handbooks) SportShelf, New Rochelle, N. Y. 1963. $1.50.

The ring culture of growing tomatoes has received some attention in Great Britain, but it is less known in the United States. This little guide is intended primarily for the British gardening beginner. The author summarizes the methods as follows: "Young tomato plants, instead of being planted direct into the border or pots and stood on the staging in the ordinary way are potted into bottomless pots or rings . . . on a bed of four inches or more of ashes, small clinkers, gravel, sand, or builder's rubble and the roots encouraged to penetrate freely into the bed. The bed, or aggregate, is kept moist so that the roots find a steady supply of moisture. The pots or rings, filled with a suitable compost, also become full of roots . . . Watering becomes a foolproof operation for the danger of waterlogging ceases to exist . . ." The advantages offered by such a system apply particularly to growing conditions existing in Great Britain.

WEEDS AND GRASSES

THE FIRST BOOK OF WEEDS. Beck, Barbara L. 66 pages, colored illustrations, indexed. (First Books) Franklin Watts, New York. 1963. $2.50.

"Weeds are plants that live and thrive where we do not want them. They crowd out, damage, or destroy the plants we would prefer to grow. But if, by magic, every weed suddenly disappeared from the face of the earth, we would lose many truly beautiful and useful plants." So begins *The First Book of Weeds*—a book written for children but which contains much of interest to all ages. Both author and publisher can be proud of the unusually fine format and illustrations. The informative text is also very well done.

PASTURE AND RANGE PLANTS. Phillips Petroleum Company. 176 pages, colored illustrations, bibliography, indexed. Phillips Petroleum Company, Bartlesville, Okla. 1963. $5.95.

In the olden days, many beautifully illustrated botanical and horticultural books owed their existence to the support of generous and affluent members of the nobility and royal families. Today, some of the leading industries are lending substantial financial support and endeavor towards the production of superbly illustrated works on important plant groups. To name a few—in 1951, The Alcoa Steamship Company sponsored *Flowering Trees of the Caribbean* (with thirty paintings by Bernard and Harriet Pertchik); in 1960, La Compañia Shell de Venezuela, issued *Orquideas de Venezuela,* a portfolio (with text) of paintings by G. C. K. Dunsterville; and now, in 1963, Phillips Petroleum Company has brought out a magnificent volume depicting pasture and range plants (including lowly weeds and poisonous plants) with over one hundred and fifty fine color plates and an excellent running text. This Company (which received in 1962 the U. S. Department of Interior's Conservation Service Award) began in 1955 to produce a series of educational booklets on grasses which were designed to help students, researchers, farmers, and others who are concerned with this group of plant life. Because of the great interest and demand for these booklets, The Phillips Petroleum Company has had the six booklets bound into one volume and now presents them under the title *Pasture and Range Plants.*

WEED CONTROL HANDBOOK, 3rd ed. The British Weed Control Council. Edited by E. K. Woodford and S. A. Evans. 356 pages, illustrated, indexed. $4.00.

Active modern research in chemical weed control has necessitated a third edition of this standard British compendium. It must be remembered that the recommendations are made for The United Kingdom and, in some cases, the commercial products discussed are not available in the American market.

FERTILIZERS AND FIELD CROPS

APPROVED PRACTICES IN PASTURE MANAGEMENT, 2nd ed. McVickar, Malcolm H. and John S. 332 pages, illustrated, indexed. The Interstate Printers and Publishers, Danville, Ill. 1963. $4.25.

This updated revision of the 1956 original edition will be useful for agricultural students, 4-H Club members, county agents, and others who are interested in forage production. The senior author was formerly Chief of the Agronomic Education of the National Plant Food Institute, and the junior author is Professor of Agronomy and Head of the Agriculture Department of Western Illinois University.

FERTILIZERS AND PROFITABLE FARMING. Cooke, G. W. 122 pages, bibliography, indexed. Chemical Publishing Co., New York. 1963. $4.50.

Dr. Cooke, who is Head of the Chemistry Department of the Rothamsted Experimental Station, has a background of many years of lecturing to British farmers on efficient management of soils and fertilizers. His practical manual contains much which will be helpful to American agriculturists.

ECONOMIC PLANTS

INDUSTRIAL WAXES. Bennett, H. Vol. I: Natural and Synthetic Waxes. Vol. II: Compounded Waxes and Technology. 324 pages, 289 pages, figures, tables, indexed. Chemical Publishing Co. New York. 1963. $12.00 per vol.

A comprehensive survey of waxes, mineral, vegetable, and animal, which are used in industry. The vegetable waxes include bayberry, candelilla, carnauba, cotton, esparto, fir, Japan, Ouricury, palm, rice-oil, sugar cane, ucuhuba, and cocoa butter.

VEGETABLE FIBRES: BOTANY, CULTIVATION, AND UTILIZATION. Kirby, R. H. 464 pages, illustrated (colored frontispiece), bibliography, indexed. (World Crops Books) [Interscience Publishers] John Wiley and Sons, New York. 1963. $13.50.

Another definitive reference work has been added to the "World Crops Books" series edited by Professor Nicholas Polunin. The author of the present volume is Assistant Director (Head of the Fibres and Economic Division) of the Tropical Products Institute, in London. The text covers certain aspects in the production of vegetable fibers (with the exception of cotton). The various fibers are discussed under plant families (which number fifteen), and there are several chapters dealing with brush-making fibers, paper-making fibers, miscellaneous fibers, and mechanized production of stem fibers.

DRUG PLANTS

HISTORY OF PHARMACY IN BRITAIN. Matthews, Leslie G. 427 pages, illustrated, bibliography, indexed. Williams and Wilkins Co., Baltimore. 1963. $9.00.

It has been said that pharmacy began when man first employed herbs for dressing his wounds, and it is a fact that the study of plants and medicine went hand in hand for many centuries. This history of pharmacy begins with the Belgae and other tribes who settled in Britain and who had a knowledge of some herbal remedies and of crude surgical procedures. It is a scholarly, well-documented work, written in a readable and stimulating style.

NARCOTICS: NATURE'S DANGEROUS GIFTS. Taylor, Norman. 212 pages, illustrated, bibliography, indexed. (Delta Books) Dell Publishing Co., New York. 1963. Paper, $1.65.

Norman Taylor's *Flight From Reality* (1949) has been out-of-print for some time, and the appearance of this revised edition (with a new title) is most welcome. Here is good reading for the layman and, because of an excellent index, it serves as a ready reference guide to a wide range of drug plants.

ECOLOGY

ELEMENTARY ECOLOGY. Reid, Douglas. 150 pages, illustrated, bibliography, indexed. Scholar's Library, New York. 1963. $1.25.

Because this intriguing little book is about British plants and animals, it has its limitations of usefulness on this side of the Atlantic. However, I envy the boys at Harrow School near Windsor Castle who have studied under such an inspiring and enthusiastic school master as Douglas Reid. Here is a sample of his style of writing, taken from the introduction of his book: "Everyone of us would like to be an explorer cutting through vast unknown tropical jungles . . . . For most of us, alas, such exciting explorations are not possible . . . . our own countryside, or even the garden, is full of things —beasts, birds and plants—which we may have noticed but never really looked at . . . . Here, then, is a vast field for exploration which can occupy us with profit and excitement for a lifetime . . . . and in the process we build up a store of knowledge which, if accurately and carefully collected and recorded, can be spoken as Ecology."

PLANT PHYSIOLOGY CHEMISTRY AND MICROBIOLOGY

THE CHEMISTRY OF WOOD. Browning, B. L., ed. 689 pages, illustrated, bibliography, in-

dexed. [Interscience Publishers] John Wiley and Co., New York. 1963. $25.00.

Twelve papers written by seventeen research workers in the field of wood chemistry and its practical applications, from the following leading institutions and departments: The Institute of Paper Chemistry, Appleton, Wisconsin; Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, Madison, Wisconsin; The Finnish Pulp and Paper Research Institute, Helsinki, Finland; Polytechnic Institute of Brooklyn; University of Washington, Seattle, Washington; and State University College of Forestry, Syracuse, N. Y. Chapter headings include: Supply and Uses of Wood; Structure of Wood; Composition and Chemical Reactions of Wood; Cellulose; Hemicelluloses; Wood Lignins; Extraneous Components of Wood; Chemistry of Developing Wood; Wood-Water Relationship; Manufacture of Wood Pulp; Wood as a Chemical Raw Material; and Chemistry of Bark.

THE GERMINATION OF SEEDS. Mayer, A. M. and A. Poljakoff-Mayber. 236 pages, illustrated, bibliography, indexed. (International Series of Monographs on Pure and Applied Biology, Division: Plant Physiology. Vol. 3) [Pergamon Press Book] The Macmillan Co., New York. 1963. $6.50.

Two staff members of the Botany Department of Hebrew University, Jerusalem, have written a scholarly treatise on seed germination in which they discuss seed structure, chemical composition, dormancy, inhibition, stimulation, metabolism, respiration, and ecological factors.

INTRODUCTION TO THE BIOCHEMISTRY OF FOODS. Braverman, J. B. S. 336 pages, illustrated, bibliography, indexed. American Elsevier Publishing Co., New York. 1963. $12.50.

A reference book of broad coverage on the biochemistry of foods in the various stages of growth, harvesting, processing, and storage. The late Dr. Braverman, with a background of research and teaching in the Near East, Europe, and the United States, has written a much-needed cosmopolitan contribution to the literature of food science.

MICROBES AND MEN. Simon, Harold J. 160 pages, illustrated, bibliography, indexed. (A Vistas of Science Book) McGraw-Hill Book Co., New York. 1963. $2.75.

"Despite the deeply rooted belief that most microorganisms are harmful, the exact opposite is true," so states optimistically Dr. Simon in the first chapter of his survey of microbes and their relation to man. This is one of the "Vistas of Science" series which is produced by the National Science Teachers Association, with the primary purpose of presenting challenging, current scientific information of interest to junior and senior high school students.

BOTANICAL PAPERS

DARWINIANA: ESSAYS AND REVIEWS PERTAINING TO DARWINISM. Gray, Asa. Edited by A. Hunter Dupree. 327 pages, indexed. (A John Harvard Library Book) The Belknap Press of Harvard University Press, Cambridge, Mass. 1963. $5.00.

The text of this noteworthy addition to the "John Harvard Library" series is reproduced from the single printing that was published in New York in 1876. Professor Dupree, who is the author of *Asa Gray, 1810-1888* (1959), has written an excellent critical introduction and has added numerous explanatory footnotes throughout the book.

SELECTED BOTANICAL PAPERS. Knoblock, Irving W. 311 pages, (Prentice-Hall Biological Science Series) Prentice-Hall, Englewood Cliffs, N. J., 1963. Paper, $3.95.

The purpose of publishing a group of outstanding articles on diverse botanical subjects, such as these, is to offer to first-year college students as well as to layman readers a wide selection of subject-matter which will help to give them a broader perspective of the vast field of plant sciences. These fifty-eight papers, written by recognized authorities, from Aristotle and Theophrastus to twentieth-century contemporaries, are arranged under the following headings: The Importance of Plants; The Development of Botany; Ecology, Phytogeography and Exploration; Systematic Botany; Anatomy and Morphology; Physiology; Radiobiology; Space Biology; Lower Plants, Diseases and Medicine; Horticulture; Forestry; Conservation; Paleobotany; Cytology; Genetics and Plant Breeding; and Evolution and Science.

WILD FLOWER SANCTUARIES IDENTIFICATION GUIDES AND CONSERVATION

CONSERVATION: THE CHALLENGE OF RECLAIMING OUR PLUNDERED LAND. Harrison, C. William. 191 pages, illustrated, bibliography, indexed. Julian Messner, New York. 1963. $3.95.

A stimulating account of the destruction and restoration of our country's natural resources and of the courageous men who had the foresight and determination to fight the plunderers, the political officials and the industrial lobbyists, in order to save and attempt to restore America's natural wealth.

THE FIRST BOOK OF WILDLIFE SANCTUARIES. Harrison, C. William. 61 pages, illustrated, indexed. Franklin Watts, New York. 1963. $2.50.

Over one hundred national wildlife refuges (in forty-five states) are listed in this useful little book. The author explains that these places of safety for wild things are usually called refuges when they are owned and administered by state or federal governments; but when owned by nongovernmental organizations of nature lovers, such as the National Audubon Society, the Nature Conservancy, the National Wildlife Federation, and other conservation-minded groups, they are called sanctuaries.

A POCKET KEY TO COMMON WILD FLOWERS. Newcomb, Lawrence. 104 pages, illustrated, bibliography, indexed. The New England Wild Flower Preservation Society, Boston, Mass. 1963. Paper, $2.00.

One of the simplest, rapid-identification keys that I have ever seen. With a reasonable amount of observational acumen, one can find the name of over 600 species of our common wild flowers. Let us take the cardinal flower (*Lobelia cardinalis*) for a sample run. For *red flowers*, we take

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No. 3, as the first digit; for *irregular flower parts*, No. 2, as the second digit, and for *toothed leaves*, No. 8, as the third digit. Turning to No. 328, we find *Lobelia cardinalis*, cardinal flower. Some of the composites and labiates are a little more complicated, but the correct goal is never far away.

REGIONAL BOOKS

FAVORITE TREES OF DESERT, MOUNTAIN, AND PLAIN. Dudley, Ruth H. 183 pages, illustrated, bibliography. Funk and Wagnalls Co., New York. 1963. $3.95.

Many youngsters and oldsters have read with keen enjoyment Miss Dudley's *Our American Trees* (Crowell, 1956). In the present volume this talented author describes vividly the favorite trees that she has selected and recounts strange and unusual facts about them. And, she is up-to-date in her findings—she notes that no longer is the great General Sherman Tree the oldest living thing in the world. In 1957 the late Dr. Edmund Schulman discovered that some of the wind-swept bristlecone pines, in the White Mountains of California, were well over the 4,000-year mark.

GRAND CANYON, [ZION], BRYCE CANYON. Wood, Frances. 32 pages, colored illustrations. (Our National Parks) Follett Publishing Co., Chicago. 1963. $1.95.

The beauty and grandeur of three of our national parks are enticingly portrayed in full-color photographs with just enough running text to guide the reader from one magnificent scenic wonder to another. An attractive book, such as this (and the other titles in this fine series of "Our National Parks") fairly shout to the restless tourist—"See America First."

JOURNEYS IN GREEN PLACES: THE SHORES AND WOODS OF WISCONSIN'S DOOR PENINSULA. Eifert, Virginia S. 222 pages, illustrated, bibliography, indexed. Dodd, Mead and Co., New York. 1963. $4.50.

Discerning readers of nature narratives are familiar with Virginia Eifert's numerous contributions. In addition to her books, she has been for many years, editor of the Illinois State Museum's publication *The Living Museum*. This most recent book of hers, with northern Lake Michigan country as a setting, has been described as a living book of ecology for the northern United States and Canada.

NOTES ON RAIATEAN FLOWERING PLANTS; WITH DESCRIPTIONS OF NEW SPECIES AND VARIETIES. Moore, John William. 36 pages, illustrated, (Bernice P. Bishop Museum Bulletin 226). Bernice P. Bishop Museum, Honolulu. 1963. Paper, $1.75.

The author's two previous publications on Raiatean flora appeared in 1933 and 1934. The present paper, based on additional specimens collected by Dr. Harold St. John, and deposited in the Bishop Museum, includes several new species and combinations.

ONE HUNDRED DESERT WILDFLOWERS IN NATURAL COLOR. Dodge, Natt N. unpaged, colored illustrations, bibliography, indexed. Southwestern Monuments Association, Globe, Arizona. 1963. Paper, $1.50.

A visit to our Great American Desert of southwestern United States and northern Mexico in the short spring season of brilliant bloom is a "must" for plant-loving travelers. The author of *Flowers of the Southwest Deserts* (1958) has selected for this little booklet one hundred of the common desert flowers, and they are portrayed in color accompanied by descriptive, historical, and herbal notes.

PLANTS AND THE MIGRATIONS OF PACIFIC PEOPLES: A SYMPOSIUM. Barrau, Jacques, ed. 136 pages, illustrated, bibliography. Bishop Museum Press, Honolulu. 1963. Paper, $4.00.

The primary purpose of the ethnobotany symposium, which was held at the tenth Pacific Science Congress in Honolulu in 1961, was to give botanists and anthropologists an opportunity to exchange ideas on what the botanist can contribute to the anthropologist and what the anthropologist can contribute to the botanist. The present publication contains the introductory remarks of Dr. Jacques Barrau and the twelve papers that were read at the symposium.

WILDLIFE IN BRITAIN. Fitter, Richard. 191 pages, illustrated, bibliography, indexed. (Pelican Books) Penguin Books, Baltimore. 1963. Paper, $1.95.

A pocket-guidebook of the plant and animal life in Great Britain. In addition to the main chapters, each of which is followed by an extensive reading list, there is an appendix which contains lists of British Natural History Societies (national, local, school, and college), County Naturalists' Trusts, Bird and Field Observatories, Field Centers, and Natural History Museums.

WILDLIFE OF THE SOUTHERN CALIFORNIA MOUNTAINS. DeLisle, Harold F. 94 pages, illustrated (part colored), bibliography, indexed. (American Wildlife Region Series) Naturegraph Co., Healdsburg, Cal. 1963. Cloth, $3.50; Paper, $1.95.

A companion booklet to the author's *Common Plants of the Southern California Mountains* (1961). Animals (including birds) listed under preferred habitats, such as, sub-alpine forest, mountain meadows, and oak woodlands.

WOODY FLORA OF TAIWAN. Li, Hui-Lin. 974 pages, illustrated, bibliography, indexed. (A Morris Arboretum Monograph) Livingston Publishing Co., Narbeth, Pa. 1963. $18.75.

An important comprehensive contribution consisting of keys, descriptions, literature citations, synonyms, notes on distribution, uses and habitats. This flora of woody plants includes 411 genera and about 1,030 species and varieties; 371 species, illustrated with carefully executed botanical line drawings, represent most of the genera. Specimens in the herbaria of Taiwan, Japan, England, and the United States are cited. The introductory chapters deal fully with the physical background of Taiwan and with the vegetation and floristic composition.

OTHER BOOK REVIEWS

NATIVE PLANTS OF PENNSYLVANIA—A trail guide to Bowman's Hill State Wild Flower Preserve. 64 pages, illustrated (partly in color), indexed. Bowman's Hill State Wild Flower Preserve, Washington Crossing, Pa. 1963. $1.50.

This is a small booklet containing descriptions and simple drawings of 111 wild species, mostly herbaceous flowering plants. The paper covers carry a dozen fine color photographs. One page presents in drawings the "parts of a flower," "arrangement of flowers" (alas, no cyme!), and "arrangement of leaves." The species described are arranged as seen on the several "walks" and "trails" at Bowman's Hill, Pennsylvania. At the end are lists of blooming-dates, and indexes.

The whole book is well printed and the typography and engraving excellent. The reviewer, of course, must be allowed a bit of fault-finding. He deplores the style of common names currently in vogue in some quarters, exemplified by "wildginger" and "marshmarigold," but gives thanks for having been spared "Dutchmansbreeches" and "falsefoxglove." In spite of the title, some of the plants are not native (one "trail" is labeled for naturalized plants). And perhaps one may be allowed a protest on the suggestion of the title, common to books on wild flowers, that *all* species of the area are represented; many a layman does not know that the "native plants of Pennsylvania" are numbered in thousands.

Aside from these minor faults—if faults they be—the little work should be extremely useful. The drawings and descriptions are accurate, many interesting tidbits of information are included, and the presentation is attractive.

H. W. RICKETT

ORIGIN AND CULTIVATION OF SHADE AND ORNAMENTAL TREES. Hui-Lin, Li. 282 pages, illustrated, bibliography, indexed. University of Pennsylvania Press, Philadelphia, Pa. 1963. $6.00.

This is an entirely delightful and informative book. Seldom have books been written by someone well informed about the Orient as well as the Western World. Mr. Hui-Lin's wide erudition and experience with plants have been presented in so simple a way that they are easy to understand.

For years I have known the plane tree was planted in mosque courtyards of the Near East, but here for the first time is the story from Herodotus about how Xerxes was so enchanted with the tree, when he invaded Greece, that he covered it with gold and gems and sat under it for several days, and the delay thus caused was one of the reasons for his defeat.

Then there is a discussion of the native habitat of the *Gingko biloba* in the mountains of eastern China, and how the tree became common all over China. It first appeared in herbals in the fourteenth century.

The black locust was one of the few trees planted by North American Indians before the arrival of the colonists—it was common near the coast of Virginia when the first colonists came. The Indians made their bows of its wood.

The recently introduced metasequoia was discovered by Japanese botanists who were surveying the natural resources of China during their occupation of that land in 1941, and collected three years later. It has proved to be hardy in widely separated regions, including Norway, Sweden, and southern Alaska.

The chapter on autumn coloring is excellent, so are the listings of ornamental flowering trees. An interesting book, helpful to all who care about trees—and who doesn't?

HELEN M. FOX
Mt. Kisco, N. Y.

PAINTING FLOWERS FOR PLEASURE. Barnes, Clara. 112 pages, illustrated, table of conetnts. Reinhold Publishing Corp., New York. $9.95.

The elements and techniques of oil painting are presented in a fresh, simplified approach. Such topics as basic forms, brush strokes, composition, color mixing, painting methods, tools and materials are treated. Eight of the author's flower paintings are reproduced in color, and more than one hundred black and white illustrations accompany the text. The work is rounded out with a section on the use of flower painting in interior decoration, with suggestions on hanging paintings and helpful pointers on framing. A bibliography on flower painting and techniques points the way to further study.

CHARLES C. CLARE, JR.

COLLECT, PRINT AND PAINT FROM NATURE. Hawkinson, John. 38 pages, illustrated (part colored). Albert Whitman and Company, Chicago. 1963. $2.95.

Easy to follow, straight-forward instructions lead the older grammar school students through the basic steps of painting with water colors from nature—leaves, flowers, trees, and simple scenes. The nineteen pages of bright, crisp color illustrations show what can be done after a little practice. Highly recommended.

CHARLES C. CLARE, JR.

A GUIDE TO MUSHROOMS & TOADSTOOLS. Lange, Morten & Hora, F. Bayard. 257 pages, 96 colored plates. E. P. Dutton & Co., Inc., New York. 18 Sep. 1963. $5.95.

The outstanding feature of this field guide to about six hundred species of fungi is that every one is illustrated in color. The 96 colored plates are reproduced from paintings and are arranged with the names and descriptions for each fungus opposite the plates. The descriptions are very brief; main reliance for identification must be placed on the illustrations. Occurrence and months in which the species appears (in Great Britain), habitat, edibility (or otherwise), and any special characteristics of growth, appearance or taste are given with the descriptions. For the edible species, the culinary value of each is given.

The opening sections of the book, with line drawings and a glossary, provide a concise introduction to fungi for the amateur. A key, using shape, color, and other individual features, should make easy identification to genera of the larger fungi. For botanists microscopic details of spores are provided in the index. Chemical tests are described and explained where relevant.

Included are 55 ascomycetes, 13 thelephors, 15 clavarias, 4 chanterelles, 8 hydnums, 35 polypores, 388 gilled mushrooms, 30 boletes, 33 puffballs and their relatives, and 9 jelly fungi. While writen primarily for Britain and Denmark, most of the species occur in America. The guide will be useful to the mushroom enthusiast.

CLARK T. ROGERSON

EDIBLE AND POISONOUS MUSHROOMS OF CANADA. Groves, J. Walton. 298 p. illustrated, indexed. 410 figs. (290 in color). The Queen's Printer, Ottawa, Canada. 1962. $7.75.

This is one of the best of the recently published books on mushrooms. Dr. Grove's introduction to mushroom collecting, identification, classification, edibility and poisoning, and so forth, clearly presents vital information which all mushroom enthusiasts, both beginners and old-timers, should study.

A workable key to genera of mushrooms follows the introduction; keys to common species of certain genera occur throughout the text; a technical key to genera is included at the end. About three hundred species of mushrooms most likely to be encountered in Canada, particularly in Ontario, are described and illustrated with colored or black and white photographs, occasionally both. All of these can also be found in the United States. The descriptions, notes on edibility and notes on habitat, important field characteristics and similarities or difference from other species are concise but adequate for identification. Some 226 species (representing 50 genera) of gilled mushrooms, 23 boletes (9 genera), 7 polypores, 3 hydnums, 6 clavarias, 1 thelephor, 4 jelly fungi, 9 gasteromycetes, and 10 ascomycetes are included.

The colored photographs (10 per plate) vary considerably in reproduction; some are excellent; many are poor; several are of little value as an aid to identification. The black and white photographs are uniformly excellent. A well-selected bibliography and a glossary complete the book.

For the money, this is a "must" for the mushroom enthusiast.

CLARK T. ROGERSON

MEDICAL MYCOLOGY. Emmons, Chester W., Binford, Chapman H. & Utz, John P. 380 pages, 388 illus. (112 figs.), 2 colored plates. Lea & Febiger, Philadelphia. July 1963. $14.00.

Without question this is the best of the many books on medical mycology. The joint authorship of a mycologist, Dr. Emmons, and two specialists in medical research, Drs. Binford and Utz, provide a well-balanced blend of the mycological and medical aspects of mycoses (diseases caused by fungi). Emphasis on the essential unity of general and medical mycology is an outstanding feature of the text.

The first seven chapters include introductory information on mycology, medical mycology, and some general problems presented by mycoses. The remaining 21 chapters cover specific mycoses or groups of closely related mycoses. For and mycologic (including taxonomic) aspects are discussed. Excellent black and white photographs illustrate these features. Three appendices give information on culture media, diagnoseach, clinical, epidemiologic, histopathologic, tic methods, and histopathologic procedures. The two colored plates illustrate results of special stains for identifying fungi in diseased tissue or smears.

The text will be useful to mycologists bacteriologists, physicians, students, and technicians.

CLARK T. ROGERSON

HORTICULTURAL PESTS DETECTION AND CONTROL. Wilson, G. Fox and P. Becker. 240 pages, illustrated, indexed. Chemical Publishing Co., New York. 1963. $8.50.

This excellent book describes and illustrates ways of recognizing pest damage by the many symptoms produced in the various plant parts. Pest control measures are brought up-to-date. A short chapter on pest damage to lawns, many new half-tones and four pages of color have been added to the present edition.

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MEMBERSHIP

We were delighted to welcome the following new members between July 31, 1963, and October 31, 1963.

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Contributing
Mrs. J. T. Howell*
Mrs. David W. Peck

Husband and Wife
Dr. and Mrs. Robert M. Bookchin
Mr. and Mrs. Raymond Winship Bristol
Mr. and Mrs. William O. Crow
Mr. and Mrs. Eugene J. Detmer, Jr.
Mr. and Mrs. A. H. Dick
Mr. and Mrs. William W. Flexner
Mr. and Mrs. Arthur E. Green
Dr. and Mrs. Bernard J. Handler
Mr. and Mrs. Frank A. McCafferty
Mr. and Mrs. William W. McKee
Mr. and Mrs. H. H. Pryor, Jr.
Dr. and Mrs. Erwin H. Rock
Mr. and Mrs. Daniel H. Sterling

Annual
Miss Lillian S. Ader
Joseph Agostine, Jr.
Ralph Arbus
Mrs. Reginald M. Archibald
Kurt D. Bahr
Mrs. Harding F. Bancroft
Miss Elizabeth Barford
Mrs. Goddard Bauer
Mrs. Mildred R. Becker
Seymour R. Berkowitz
George Bonsall
Miss Ruth E. Buchan
Mrs. Kenneth R. Berol
Timothy Brosman
Mrs. Maxine Cavey
Mrs. J. B. Clark
Jose Miguel Claudio
Mrs. Charles Cleveland
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Mrs. Luiclle V. Craumer
Kalmia Devero
Don A. Douglas
Miss Noemy Ferran
Mrs. Y. T. Finger
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Lester W. Williamson
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Mrs. M. M. Zizzamia

*Change in Classification

News, Notes (Continued from page 32)

for the several decades he has aided the arborists of this country by assisting them in the direction of the affairs of their organization."

Jan de Graaff of Gresham Bulb Farm, Gresham, Oregon, "for his contribution to our knowledge of hybridizing lilies, for his keen perception in recognizing the value and usefulness of new selections and for the generosity of his methods in making lilies increasingly popular among American gardeners."

Clarence E. Godshalk of Lisle, Illinois, "for his outstanding work in the site planning of the Morton Arboretum and for his administration and leadership in directing its affairs from the date of its inception to the present."

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Alfred Byrd Graf of Julius Roehrs Company, Rutherford, New Jersey, "for the detailed collecting, growing, and photographing of the thousands of tender ornamental plants which he has brought together from all over the tropical areas of the world, and for making them known and available to Americans for their protected patios, conservatories, and homes."

Frederick Paddock Lee of Bethesda, Maryland, "for the generous giving of his many talents to the American Horticultural Society when they were most needed, for his assistance in the establishment of the U. S. National Arboretum, and for the great amount of time and energy he has spent to augment our knowledge of azaleas."

The Society's highest award, the Liberty Hyde Bailey Medal, was presented to Norman Taylor of New York and Princess Anne, Maryland, "for a life-time spent as botanist, explorer, curator, author, editor, and advisor to thousands. He has continually been contributing to our knowledge of horticulture in all its many facets, for over half a century." Dr. Taylor spent seven years at The New York Botanical Garden, first as a Museum Aide in 1904, then as Assistant Curator. Later he became Curator of the Brooklyn Botanic Garden. In 1961, he received the Distinguished Service Award of The New York Botanical Garden.

Dr. Russell Seibert, Director of Longwood Gardens, Kennett Square, Pennsylvania was elected President; Dr. Raymond C. Allen, Director of Kingwood Center, Mansfield, Ohio, First Vice President of the American Horticultural Society.

At the annual meeting of the American Association of Botanical Gardens and Arboretums, Dr. Fred C. Galle, Director of Callaway Gardens, was elected President; and at the annual meeting of the Garden Writers' Association of America, Robert Waln of St. Louis, Missouri, was elected President. These two organizations held their meetings in conjunction with the American Horticultural Congress.

Robert Everard Woodson, Jr. After a brief illness brought on by a heart attack, Robert Everard Woodson, Jr., died on November 6, 1963, at his home in Richmond Heights, a suburb of Saint Louis, Missouri. He was born on April 28, 1904, in Saint Louis, the second child and only son of Robert Everard and Ada Lee (Cowan) Woodson.

Doctor Woodson received his A.B. degree in 1926 from Washington University (Saint Louis) and an M.S. in Botany, as a Rufus J. Lackland Fellow of the Missouri Botanical Garden, in 1927; an M.A. in 1928 from Harvard University after a year's graduate study at the Gray Herbarium; and his Ph.D. at Washington University in 1929, again as a Lackland Fellow, during the years 1928-1929.

He held the post of Instructor at Washington

University from 1929 to 1935, becoming Assistant Professor (1935-1942), Associate Professor (1942-1945), and Professor in 1945. In 1958 he was appointed Curator of the Herbarium at the Missouri Botanical Garden, which latter position he retained until his death. Concurrently with his teaching in the Botany Department at graduate as well as undergraduate levels, he continued research on the *Apocynaceae* and *Asclepiadaceae*. His publications on these groups, both taxonomic and floristic, are classic.

In the early thirties, a program of plant collecting in Panama was instituted, progressing through the years under Woodson's supervision. The resulting publication of the Flora of Panama, undertaken with the assistance of collaborating specialists with Woodson as editor, was in progress at his death.

Doctor Woodson was a member of the Botanical Society of America, the Society for Study of Evolution, The American Geographic Society, and the American Society of Plant Taxonomists, of which latter he served as secretary-treasurer in 1947 and as president in 1953. He was early elected to Phi Beta Kappa and Sigma Xi, and later to the Saint Louis Academy of Sciences. In 1953, he became consultant for Ciba Pharmaceutical Products, Inc. The 1962-1963 edition of *Who's Who in America* includes his biography.

Woodson did not confine his research to the area of taxonomy alone. His publications include articles on evolution and plant geography as well. His treatment of *Asclepias* is still a pioneer publication in the field of statistics applied to botany. His early collaboration with Edgar Anderson on cytogenetic significance in *Tradescantia* was one of the first ventures of a taxonomist in this area of research. At the time of his death, Woodson was concerned with a new line of research involving the chemical analysis of the pigments of *Asclepiadaceae* and their inheritance.

Robert Everard Woodson will be missed by his colleagues not only for his botanical contributions but for his personal qualities as well.

CAROLINE K. ALLEN

Francis A. Bartlett, a leading authority on shade trees and their care, died at the age of eighty-one on November 24, 1963. More than fifty years ago he founded the Bartlett Shade Tree Experts Company which now has research laboratories, experimental grounds, and a school for tree surgery in North Stamford, Connecticut, and branch offices in many eastern and middle western localities.

After receiving a B.S. degree from the Massachusetts Agricultural College in 1905, he taught horticulture at Hampton Institute. Two years later he moved to Stamford and began his work with trees, and his study of their diseases and methods of prevention. In 1924 he called together a group which founded the National Shade Tree Conference, now the International Shade Tree Conference.

Dr. Bartlett—he received an honorary Doctorate of Agriculture from the University of Massachusetts in 1945—was the author of many scientific articles, bulletins, and several manuals on tree care.

Dr. Johnson Parker has been appointed physiologist of the Bartlett Tree Research Laboratories at Stamford, Connecticut. He was Assistant Professor of Plant Physiology at the Yale School of Forestry. Dr. Parker will pursue his studies of plant hardiness and will conduct research on non-infectious diseases of shade trees, especially those attributed to cold, heat, drought, and injury caused by water imbalance.

Torrey Botanical Club. At the fall-winter 1963 meetings the following lectures were given: "Flowers and Gardens of the Orient" by T. H. Everett, Assistant Director (Horticulture) of The New York Botanical Garden, on October 22; "Ferns of Iceland" by Dr. J. J. Copeland of City College on November 5; "The Andean Transition Flora in Northern Peru" by Dr. J. J. Wurdack of The Smithsonian Institution on November 19; "The Role of Chlorophyll and Accessory Pigments in Photosynthesis" by Dr. Marcia Brody of Hunter College on December 3; "The Forests of Northern New Jersey" by Dr. Murray Buell of Rutgers University on December 17.

At the annual dinner and meeting to be held on January 21, 1964, Dr. Bassett Maguire will give his presidential address.

A rare plant, described as "one of the weirdest ever discovered" and the first mature living specimen of its kind in the United States, recently became the property of the Botany Department of Pomona College, Claremont, California.

The plant, a member of the Welwitschia Family, occurs only in a remote area of the Namib Desert in South West Africa. Permission to remove the plant from the desert was granted to Dr. Lyman Benson, Chairman of the Botany Department, who was on a thirty-two-hundred-mile tour of South African deserts as a guest of the National Botanic Gardens of South Africa. Dr. Benson, an expert in the biology of American deserts, and at one time a Research Fellow at The New York Botanical Garden, had only hoped to obtain a herbarium specimen. A few herbarium specimens and a few seedling plants are in some botanical gardens; Montreal is known to have several seedlings three or four inches in diameter.

A typical *Welwitschia* has a stem about four feet in diameter and only about six inches tall. It has two ribbon-like leaves, six or eight feet long and a foot or more wide. The plant now at Pomona College and weighing about fifty-one pounds, is a mature female form with cones as big as hen's eggs. The cones, according to Dr. Benson, are red when they are fresh and mature.

Exploration for ornamentals in Russia was recently undertaken by the United States Department of Agriculture in cooperation with Longwood Foundation, Inc., Kennett Square, Pa. Dr. John L. Creech has reported that ornamentals of value were not as plentiful as fruit stock; food crops are far more important to the Soviets, and relatively little stress is put on ornamental research. "However, we did find a showy, cream-colored canna at the Nikitsky Botanical Garden in Yalta, and a hardy hawthorn which may prove to be a good hedge plant in dry areas. We made collections of wild dogwoods, the berries of which are edible and are used to make jam in Russia," he remarked.

At the Nikitsky Botanical Garden was the best arboretum that Dr. Creech and Dr. Scott visited in Russia. In studying records at this 151-year-old institution, Dr. Creech found that its scientists claim to have introduced the American sequoia (coast redwood) to Europe; seeds were brought to Yalta from a Russian settlement at what is now Ross, California, in 1840 and propagated at the Nikitsky Botanical Garden. Some of these trees have attained a height of about ninety feet. "They told me, too," added Dr. Creech, "that sequoias have been introduced into forested areas of the Black Sea region as a timber tree."

Dr. Creech and Dr. Donald H. Scott, both of Agricultural Research Service, brought back bud-shoots of wild apple, pear, and cherry as well as of many cultivated varieties of fruits of exceptional cold hardiness. The fruit collection should prove useful to breeders in this country, who are working on improved, hardier, more drought-resistant root-stock. Arrangements for the trip were made last summer by Secretary of Agriculture Orville L. Freeman during a visit to the Soviet Union.

Among 1964 flower introductions is a favorite of former days—hollyhock. George W. Park Seed Co. of Greenwood, South Carolina, is offering hollyhock 'Powderpuffs Mix'. The large, fully double flowers in pink, rose, lavender, scarlet, yellow, and white are closely packed together on two-foot spikes; they make a fine display at the back of a flower border or against a white picket fence.

'Blythe Spirit', a named variety of *Exacum*, a member of the Gentian Family, can be grown as a winter pot-plant or raised from seed sown in February for summer bedding. The six-inch-high plant bears fragrant, half-inch wide, white flowers instead of the usual blue or lavender.

As the number of annuals which tolerate shade is limited, gardeners will be interested to learn of *Salvia splendens* 'Snow Tips' and *Nico-*

Gloriosa daisy 'Pinwheel'.

Above. *Salvia splendens* 'Snow Tips'.

Right. Hollyhock 'Powderspuff'.

tiana 'Lime Sherbert'. 'Snow Tips' makes a compact plant, twelve inches high, bearing an attractive flower; the calyx is striped scarlet and white, the corolla a delicate pink with a white tip. 'Lime Sherbert' carries, as its name implies, lime-green flowers on vigorous, eighteen-inch-high plants. This new nicotiana adds a refreshing color to a bed or border of annuals. These two annuals and *Exacum* 'Blythe Spirit' are also being offered by George W. Park Seed Co.

Flowers, five inches wide, in a bold pattern of mahogany and gold are produced by gloriosa daisy 'Pinwheel'. If planted early, the vigorous plants, to two and a half feet tall, will bloom the first year, providing a wealth of bloom for the garden. They survive zero temperatures as well as being able to endure the heat of summer. 'Pinwheel' is being introduced by W. Atlee Burpee Co.

Floribunda rose 'Amberlight', originated by Le Grece of England, is exceptionally fragrant, a quality missing in many modern roses. It bears large clusters of semidouble, ruffled flowers on erect wiry stems—good for cutting for use in flower arrangements as well as making a fine garden display. The flower color is a clear amber paling to Egyptian buff. The foliage of 'Amberlight' is healthy, the growth of the plant very vigorous.

Another floribunda rose, 'Lilac Charm', drew considerable notice when it was exhibited in England in 1960. The lilac to almost violet-color of the open flower contrasts effectively with its golden-yellow stamens. As the plant is of medium height, it is useful as an edging to a rose bed or can be planted in a bed by itself. These two patented roses, 'Amberlight' (Plant Patent No. 2197) and 'Lilac Charm' (Plant Patent No. 2189) are among the new and the little-known plants which Wayside Gardens of Mentor, Ohio, will introduce this spring.

A SUNDAY MORNING IN THE GARDEN

By Theodore Kazimiroff

Dr. Kazimiroff, Historian of the Borough of the Bronx, New York, is a member of the Corporation of The New York Botanical Garden. He knows the Garden well, having roamed it as a child and as a young man. He has brought troops of Boy Scouts and Girl Scouts here, and conducted — and still conducts — nature walks through the gardens, meadows, and woodlands.

My daughter Julie, a pupil in the third grade at Villa Maria Academy, had to memorize a poem about all the leaves attending an October party. To make it interesting, I suggested a large chart with leaves pasted on it and identified, and little faces (cut out from "ads") also pasted on, with hands and feet sketched in, to give third-graders an additional impetus in leaf identification. (The finished product all but brought down the classroom!)

So on Sunday, October 27, 1963, 10:30 a.m., Julie and I went to The New York Botanical Garden to pick up suitable colored leaves. As we walked along, two women and a nine-year-old boy passed by. I couldn't help but overhear the women, speaking in Russian, say to each other that they wished they knew more about the Garden. Impulsively I addressed them in Russian, asking if I could be of any assistance. With that they pointed to the other members of their party, who were getting out of an official limousine with DPL license plates. The party, numbered seven, three couples—husbands and wives —and the boy Andre. I introduced myself and inquired what they wanted to see, to which they replied they had heard about the beauty of the Garden at the UN and anything I could show them would be appreciated. So Julie and I went into the "guided tour" act.

I explained my Russian parentage, and they informed me they were delighted to meet some one who could speak or understand Russian. (I do the latter, not too much of the former.) They were UN personnel, and with the amenities of introduction out of the way, we spent a perfectly charming ten minutes during which I endeavored to explain the nature of The New York Botanical Garden, its scope and objectives.

Then entered a character who had me worried for the next fifteen or twenty minutes, as I feared that his intrusion and remarks might lead to an "international incident." While I was describing the pawlonia and persimmon trees, this chap walked over to our party. Usually every time I lead a walk through the Garden, a few side-listeners quietly join the group, so I didn't think too much about this man. However, when he began talking strangely about foreigners, and Germany, and Hitler, I became mildly apprehensive, especially as I could not prevail upon him to depart. Fortunately, the Russian visitors couldn't understand. I led them to the Museum and Administration Building, and telling them to enjoy the exhibits, called for assistance in getting rid of the unwanted addition to our group. With this accomplished neatly and efficiently, the Russian visitors, Julie, and I continued our tour. They were impressed with the exhibits in the Museum and with what I told them about the Library and Herbarium. They were also greatly interested when I explained some of the investigations and studies under way in the Research Laboratory.

The dahlias fascinated our foreign visitors—cameras were in operation for half an hour. Nowhere in Russia had they seen anything more beautiful. At the "mum" garden and borders, more exclamations of praise, more pictures taken to be sent back to Russia. At the lily pools, again excited picture-taking.

Then the Conservatory. I gathered from their conversation with one another that the Conservatory was bigger and better than any they had seen in Russia.

The charm and solitude of the Rock Garden delighted them and the chipmunks fascinated them. Suddenly they "found familiar friends far from home," as they said to me—crows flying overhead and the lovely birch trees. They assured me that their "veroni" (crows in phonetic Russian) were the same as ours; and that many Russian poems and songs center around the birch tree, "birosa." When I pointed out a black birch, they were absolutely shocked; they regarded it with awe. "A 'chorni birosa' would never be believed in Russia."

They went on their way after further words of praise for the scope and beauty of the Garden, each one personally thanking Julie and me, shaking hands and exchanging addresses.

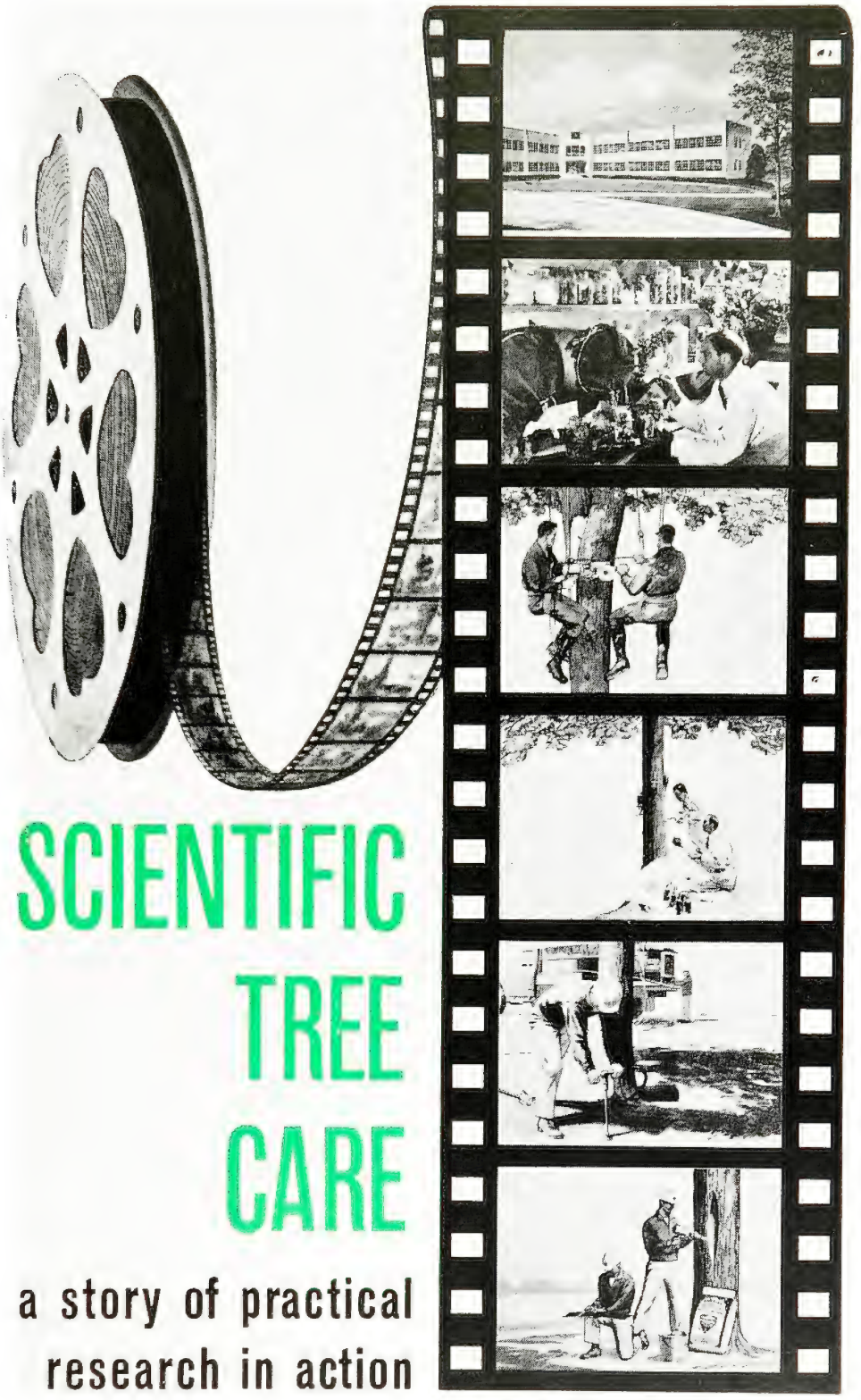
I believe that such a friendly meeting and tour can do more to establish international friendship and solidarity than the endless harangues at political bargaining tables. There was nothing unpleasant or controversial throughout the entire episode. Julie and I met these Russian folks on equal terms in beautiful surroundings, and we feel that we contributed an infinitesimal bit toward helping to promote world harmony. The beauty and peace of your lovely Garden did the rest.

LETTER TO THE EDITOR

I enjoyed reading Dr. Fulling's "Holiday Reminiscences" in the November-December, 1963, issue. Quite a series of coincidences!

For me, there were two additional ones: I was the leader of the biological foray to the high peak area that Dr. Fulling mentioned; and Dr. Egler, author of the article on "Conversations in Ecology VI," was my predecessor in the Forestry Botany Department. (I now teach the forest ecology course that he formerly taught.) Also Frank mentions Dr. Hirt who is still here with us.

E. H. Ketchledge
State University College of Forestry
at Syracuse University
Syracuse, N. Y.



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THE [illegible]W YORK BOTANICAL GARDEN

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THE GARDEN JOURNAL

DOROTHY EBEL HANSELL
Editor

Calendar

March 7-15, 1964. Forty-seventh International Flower Show: Theme, "Gardens are for Living." The Coliseum, New York.

March 8-14, 1964. Philadelphia Flower Show: Theme, "Old Philadelphia." Trade and Convention Center, Philadelphia.

March 14-22, 1964. Ninety-third New England Spring Flower Show: Theme, "Gardens for Living." Wonderland Park, Revere, Mass.

March 15-20, 1964. Eighteenth Annual Williamsburg Garden Symposium: Theme, "Our Evolving Garden Heritage."

March 22, 1964. Lorillard Snuff Mill Restaurant opens.

March 22-April 5, 1964. Easter Show in the Conservatory of The New York Botanical Garden.

April 18-25, 1964. Thirty-first Annual Historic Garden Week in Virginia.

April 22-24, 1964. Garden Forum at the Henry Ford Museum, Greenfield Village, Dearborn, Mich.

April 29, 1964. Members' Garden Party.

April-October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle-Stadion Betriebsgesellschaft m.b.h., Vienna 15, Vogelweidplatz 14, Austria.

May 4, 1964. Annual Meeting of The New York Botanical Garden.

May 16, 1964. May Market—rare plants—at the Greenwich Garden Center, Bible Street, Cos Cob, Conn.

May 21, 1964. Spring Garden Tour, sponsored by Volunteer Associates, The New York Botanical Garden, to Far Hills, Somerville, Peapack, and Gladstone, N. J.

May 22, 1964. Eleventh Annual House and Garden Tour for benefit of the Institute of Physical Medicine and Rehabilitation, New York University Medical Center. For information, Mrs. Edna Blankfort at the Institute, 400 East 34th St., New York.

June 7, 1964. Rose Day at The New York Botanical Garden.

September 30, October 1, 2, 3, 1964. Nineteenth Annual American Horticultural Congress; October 2 to be spent at The New York Botanical Garden. Hotel headquarters, Commodore Hotel, New York City. Annual meetings of the American Association of Botanic Gardens and Arboretums and Garden Writers Association of America will be held in conjunction with the Congress.

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Credit for Illustrations

Front-cover illustration, **Narcissus pseudo-narcissus,** in the Thompson Memorial Rock Garden and, frontispiece, **Magnolia stellata** at the side of the Museum and Administration Building, photographed by Walter Singer; pp. 43-45, U.S.D.A. Photographic Service, Plant Industry Station, Beltsville, Md.; p. 46, The Mount Vernon Ladies Association, Mount Vernon, Va.; p. 47, upper, Abbie-Rowe, National Park Service, U. S. Dept. of Interior, Washington, D. C., and lower, Virginia Chamber of Commerce, Williamsburg, Va.; Blandy Experimental Farm, Boyce, Va., and **The Boxwood Bulletin**; p. 49, upper, Thomas L. Williams, Williamsburg, Va.;—courtesy John T. Baldwin, Jr., College of William and Mary, and lower, Tennessee Botanical Gardens, Cheekwood, Nashville; pp. 50-53 Rex Murfitt; p. 54, Arbordale, Morton Arboretum, Lisle, Ill.; p. 56, Charles C. Clare, Jr.; pp. 57-60, 75, Alice Dustan Kollar; pp. 65-68, Arthur W. Ambler; pp. 70, 72, 73, 74, Walter Singer.

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THE MAGNIFICENT MAGNOLIAS

By WILLIAM F. KOSAR

Mr. Kosar is the geneticist of the United States National Arboretum, Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Washington, D. C.

BOTANICALLY, the genus *Magnolia* is placed among the ancient trees and shrubs of the earth, dating back to the earliest arrival of plant life. Through countless ages, its basic plant structures have resisted evolutionary changes. The flowers are large, solitary, and located at the ends of branchlets. The numerous stamens and carpels are spirally arranged on an elongated axis. The carpels develop into a conelike fruit from which the red seeds are suspended at maturity by long, thin threads. Some of our native magnolias are commonly called "cucumber trees" in reference to the characteristic shape of the fruit.

Magnolias are native to two separate regions of the world. One includes southeastern United States, Mexico, Central America, and the West Indies. The other region comprises Japan, southeastern China, the Himalayas, and the area southward to Java. It is interesting to note that fossil leaves, fruits, and seeds representative of European and North American species during the Cretaceous and Tertiary ages agree closely with living species of *Magnolia* presently found in these widely separated regions.

The genus *Magnolia* was first described and named by Linnaeus in honor of Pierre Magnol who was Director of the Botanic Garden at Montpellier, France, from 1638-1715. In the first edition of *Species Plantarum,* published in 1753, Linnaeus recognized but one species, *Magnolia virginiana;* at present about seventy species have been described.

Historically, the *Magnolia* is also considered to be one of the oldest flowering trees used as an ornamental. Its cultivation is closely associated with Buddhism. More than thirteen centuries ago, the monks of central China became acquainted with the precocious floral display of a *Magnolia* species which they called "Yulan," meaning "Lily Tree." Specimens were collected in the wild and moved to temple gardens where the simple beauty of the large, white flowers could be admired. It is the flower of this tree that is so often pictured in early Chinese porcelain, paintings, and tapestry. There was a cultural exchange between China and Japan during the Tang Dynasty (618-907 A.D.) and sometime during this period "Yulan" was introduced to the Japanese gardens by the Buddhist monks. It was not until 1780 that Sir Joseph Banks introduced *Magnolia denudata* (Yulan) to the gardens of England. Thus, after centuries of cultivation by the Orientals, the Western World finally was able to appreciate the beauty of this ancient plant.

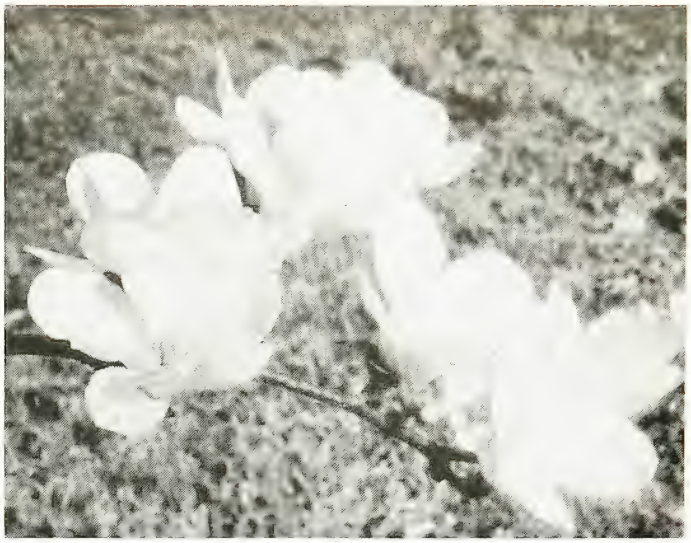
Yulan *(M. denudata)* is an excellent deciduous tree, hardy to Zone 6* (—10° to 0°). The white to creamy white flowers appear in early April before the leaves. The expanding buds assume the shape of white tapers, progressively changing in shape from chalices to shallow cups and finally to saucers. The typical flower has nine tepals, arranged in three whorls of three. Botanists have conveniently coined the term tepal to describe a segment of the flower which is not clearly differentiated into sepals and petals. Each individual flower may take two days to open fully to a diameter of six to eight inches. The opening flowers are pleasantly fragrant. After the floral display, the tree is clothed with large, obovate leaves from four to six inches long. The habit of the young tree is broadly pyramidal. At maturity, the gray-stemmed tree may reach a height of forty feet and become widely spreading with a rounded top.

The lily magnolia *(M. liliflora)* is a deciduous, shrubby species, hardy to warmer parts of Zone 6. This species has a late and long period of flowering, usually commencing about the time the leaves begin to unfold during late April and continuing for at least two weeks. The vinous purple flowers, four to five inches long, are borne erect on the slender branchlets. The typical flower has six purple petals and three triangle-shaped, pale green sepals about an inch long. The dense habit of this shrub is due to the annual development of shoots from the crown and the bending downward of the older branches. The mature height may reach eight to twelve feet, with a slightly broader spread.

Like the Yulan magnolia, the lily magnolia was used as an ornamental around temples in China and Japan. Because of its long period of cultivation, it is difficult to find the type species in its wild state in China. Introductions which came to us from Japan may have been altered by selection or hybridization. The first recorded introduction from Japan to England was made by the Duke of Portland in 1790. Purple lily magnolia *(M. liliflora nigra),* introduced from Japan in 1861, is considered the best variety for culture in this country. It is hardier than the species and has larger, dark purple flowers.

After the introduction of the two ancient species to Europe, there was an era during which the simple beauty of the "straight" species was improved through garden hybridization. A French soldier, Chevalier Solange Bodin, retired after the peace of 1814 to a garden at Fremont, near Paris. As founder of the National Horticultural Society of France, he devoted himself to the aesthetic aspect of horticulture. One of his projects included the union of two ancient *Magnolia* species, thus producing hybrid progeny which even today are considered desirable ornamentals and are more widely planted than either parent. It is believed that *M. denudata* was the female, or seed parent, and that *M. liliflora* was the male, or pollen parent. The first plants flowered in 1826, and it is recorded that sometime during the 1820's the entire stock of hybrids was sold for a large sum to a nurseryman near London. Later, similar crosses were made by Belgian and Japanese gardeners. Probably second generation selections and maybe even backcrosses have been made during the last hundred years. Thus today there is a variety of colors and habits to choose from this

*Plant Hardiness Zone Map. Miscellaneous Publication No. 814, Agricultural Research Service, United States Department of Agriculture.



Left. The Yulan magnolia, *Magnolia denudata.*
Above. Close-up of the beautiful white flowers of the Yulan magnolia.

complex that is grouped under *Magnolia* × *soulangiana.*

The saucer magnolia *(M.* × *soulangiana)* is a deciduous, small tree or large shrub, hardy to Zone 6. The identity of the original clone or clones of the *soulangiana* hybrid may be lost to modern horticulture; however, we have many diverse varieties or cultivars which claim the same parentage. Some have competed successfully over a period of years for a place in the landscape, others have been recommended for discard. A few of the outstanding cultivars follow:

1. 'Lennei'—a vigorous, large, spreading shrub. The large, saucer-shaped flowers are the deepest reddish purple. It flowers at the same time as *M. liliflora nigra.*
2. 'Rustica'—a seedling of 'Lennei' with slightly smaller flowers of a rosy red hue. It flowers ahead of 'Lennei'.
3. 'Verbanica'—a small tree-type, flowering about the same time as 'Rustica'. The flowers are large, chalice-shaped, and of a pleasing lavender-pink.
4. 'Alexandrina'—a large shrub-type, flowering shortly after *M. denudata.* The flowers are cup-shaped with a pleasing pink cast and a minimum amount of purple.
5. 'Alba'—the cultivar closely approaching the white of *M. denudata,* even though there is a flush of purple at the base of the tepals. It is a small tree-type, flowering about the same time as 'Rustica'.
6. 'Lilliputian'—valued for its smaller shrub habit, smaller purplish pink flowers, and late flowering period.

There are other excellent cultivars of *M.* × *soulangiana* available, many of recent origin. However, the listing above indicates the diverse flower color, habit of growth, and flowering season available in this hybrid group, and the necessity to specify a definite cultivar for a particular use.

Veitch magnolia *(M.* × *veitchii)* is a deciduous, medium-sized tree, hardy to warmer parts of Zone 7 (0° to 10°). This hybrid originated at the Royal Nursery, Exeter, England, in 1907; Peter C. M. Veitch used the pollen of *M.*

Right. Sprenger magnolia, *Magnolia sprengeri diva.*
Below. Close-up of the crimson flower, often eight inches across, of Sprenger magnolia.

Top row, left, *Magnolia* × *soulangiana* 'Verbanica' and, right, *M.* × *soulangiana* 'Alba'.
Bottom row, left, *Magnolia* × *soulangiana* 'Alexandrina' and, right, *M.* × *soulingiana* 'Lennei'.

campbellii on the flowers of *M. denudata.* The parent *M. campbellii* is a native of the Himalayas, and the tree itself is outstanding among all magnolias in that it bears huge rose-colored flowers very early in the spring. However, it is a tender species, adaptable to Zones 9 and 10 (20° to 40°) of the West Coast. The first of five seedlings of this cross bloomed in 1917; four were white-flowered, while the fifth bore large, blush-pink flowers. The pink-flowered clone is distributed today under the hybrid designation.

Magnolia × *veitchii* flowers in early spring, before the leaves appear, about the same time as *M. denudata.* It is a vigorous grower with foliage and flower characteristics intermediate between the two parents.

Sprenger magnolia *(M. sprengeri diva)* is an excellent tree, hardy to Zone 7. It may extend to the warmer parts of Zone 6, based on its performance at the National Arboretum; there was no twig or bud injury during the winter of 1962-1963 when temperatures dropped to 2°F. This species, native to central China, was introduced into England about 1900. The original plant grown from introduced seed is located at Caerhays Castle in the collection of magnolias assembled by J. C. Williams. It is a beautiful tree over forty feet high, its crimson flowers opening in March before leaves appear. Its twelve tepalled flowers, often eight inches in diameter, even rival those of *M. campbellii* in size and beauty.

The star magnolia *(M. stellata)* is either a large shrub or small tree, hardy to Zone 6. It is one of the hardiest Asiatic magnolias introduced from Japan. This species is popular because of its precocious, white flowers which are relatively small (three inches in diameter). It differs from other species in that each flower may have fifteen to twenty tepals. Plants of this species should be vegetatively propagated from select clones, since seedlings are usually inferior to the parent plant. Shades of pink are available in cultivars of the species, namely, 'Rosea', 'Waterlily', and

Upper left. *Magnolia cordata.*

Center. *Magnolia* × *veitchii.*

Upper right. *Magnolia acuminata.*

Lower left. *Magnolia virginiana.*

Lower right. *Magnolia stellata rosea.*

'Rubra'.

Magnolia × *loebneri* is a deciduous tree, hardy to Zone 5 (—20° to —10°). This vigorous hybrid between *M. stellata* and *M. kobus* is valuable because of its hardiness and its white flowers, which are larger than the flowers of either parent. The cultivar 'Merrill', introduced by The Arnold Arboretum, is considered one of the best early white-flowering magnolias. The original hybrid produced in 1939 is now a symmetrical tree over twenty-five feet tall.

Kobus magnolia *(M. kobus),* a white-flowering, deciduous tree, hardy to Zone 6, is a native to Japan. When grown from seed, it is variable as to growth and flowering habit. A select cultivar has been introduced by the University of Washington Arboretum, Seattle, Washington, which has larger flowers and also bears them at an early age. The original clone, produced in 1940, is now over twenty-five feet tall and has been named 'Wada's Memory'.

Most of the discussion has centered around the precocious Oriental species and their hybrids. What have our native American species contributed to the magnificence of the *Magnolia?*

The cucumber tree *(M. acuminata),* a large, deciduous tree, can be found in the wild from New York to Georgia and west to Illinois and Arkansas. It is hardy to Zone 5. The flowers are of interest in that the inner three petals are a clear yellow, the outer three petals greenish yellow, and the three reflexed sepals green. The tree is extensively planted as an ornamental shade tree because it grows rapidly under favorable conditions.

The yellow cucumber tree *(M. cordata)* is a small, deciduous tree restricted in its natural distribution to Georgia but is hardy to Zone 6. The leaves and flowers are smaller than those of *M. acuminata.* The petals are a bright canary-yellow. It is useful for landscaping small properties.

Sweet bay *(M. virginiana),* a large, deciduous shrub or small tree, has a natural distribution extending along the East Coast from Massachusetts to Florida. It is hardy to Zone 6. The lustrous green leaves and waxy white, fragrant flowers (two inches in diameter) in early summer make this species a desirable addition in landscape planting.

Southern magnolia *(M. grandiflora)* is a large evergreen tree, hardy to the warmer parts of Zone 7. Found in the wild from North Carolina to Florida and west to Texas, it is considered the choicest representative of the genus in North America. As an ornamental, *M. grandiflora* combines a late summer floral display with large, lustrous foliage. The flowers are six to ten inches in diameter, white and very fragrant. Its dense, pyramidal growth habit is unexcelled for specimen use. During recent years, there has been increased activity in the selection of outstanding clones, so that at the present time there are about fifty cultivars of this species from which to make a selection.

There is record of a specimen of southern magnolia in the vicinity of Newark, New Jersey, which is about fifty years old and over thirty-five feet in height. A neighboring nurseryman introduced this cultivar as 'Miss Boque'. During the winter of 1934, a grafted propagation of this selection withstood 24°F. below zero, which would extend the hardiness to Zone 5. It is outstanding individuals of a species such as this which the dedicated gardener should be observing—he can engage in exciting plant exploration in his own neighborhood gardens.

In December, 1835, the greenhouse or "orangerie," as structures of this sort were usually called, at Mount Vernon was destroyed by fire. It was reconstructed in 1950-1951. The parterres are planted with boxwood in the fleur-de-lis motif described by Benjamin Latrobe in 1796.

BOXWOOD

By JOHN T. BALDWIN, JR.

Dr. John T. Baldwin, Jr., is Professor of Biology at the College of William and Mary, Williamsburg, Virginia. At the seventeenth annual American Horticultural Congress, held in Norfolk, Virginia, in April, 1962, and at the second annual meeting of the American Boxwood Society, held in Boyce, Virginia, in May, 1963, Dr. Baldwin talked on "Boxwood." A resumé of his talk appeared in *The Gardeners Forum* (June, 1962) of the American Horticultural Society and in *The Boxwood Bulletin* (April, 1963) of The American Boxwood Society.

RECENTLY I HEARD it claimed that green gardens are effective only for sophisticated gardeners. If the greenness be that of boxwood, I do not agree with the claim. Boxwood is grown on the estates of the rich and by the doorways of the poor. In both situations it is appreciated for its stately and dignified masses of green. An added attraction is the extremely delicate to foxy odor of the foliage —the fragrance is sensuous and pervasive. The spicy perfume of its flowers, especially of some of the Asiatic species is penetrating and delightful; yet few people seem to be familiar with it.

Boxwood was brought to Virginia by the early settlers and has ever since been a prized horticultural subject in these parts. It is known that Colonel Custer had imported boxwood as early as 1726; that boxwood had been set out, between 1688-1735 by William Byrd and his son, at Westover, one of the earliest and loveliest plantations in this country; that Tedington on the James River had a magnificent terraced garden, though only a cemetery remains to suggest what the place was like. The cemetery is surrounded with *Buxus sempervirens* var. *arborescens,* and the oldest date in the cemetery is 1727. But priority for a definite record of introduction of boxwood must go to Long Island. It is recorded that Nathaniel Sylvester went there in 1652, founded a manor, and soon thereafter "set plantations of boxwood around it."

Buxus (the botanical name for the genus) is usually reported to consist of about thirty species in the mountains of central and eastern Asia, of North Africa, and of southern Europe; also in Madagascar, tropical and South Africa, the West Indies, and Central America. In this complex of plants, generic lines are not sharply delimited, and botanists do not agree as to where the lines properly are. Very probably the number of species in *Buxus* is considerably less than thirty. Here in Virginia we are concerned with five species or, for all practical purposes, with only three.

Until about a hundred years ago all the boxwood grown in the United States were selections of *Buxus sempervirens.* This species occurs across southern Europe—back from the Mediterranean and across western Asia to Iran, and in North Africa. The wood of this plant has long had many uses, consequently stands of boxwood in many areas have been decimated. One of the large-scale uses was for shuttles for power looms, but the wood became so expensive that substitute woods were sought. The woods of our flowering dogwood and of our persimmon replaced boxwood in the shuttle trade. Records show that the first shipment of these substitute woods went from the James River Basin by way of Boston to Liverpool in 1865.

Introduction of *Buxus sempervirens* to the British Isles antedates recorded history. Because the plant was evergreen and long-lived and easily propagated by cuttings, the people on the Continent and in the British Isles built up connotations of immortality with boxwood and developed religious

Buxus microphylla var. 'Green Pillow' edges the flower borders on both sides of the lawn of the Executive Mansion, The White House, Washington, D. C. This is the garden that was designed by Mrs. Paul Mellon.

associations with it. So boxwood was a part of the cultural background of many of the European immigrants to Colonial America. For sentimental, religious and utilitarian reasons, they brought boxwood with them. They introduced clones from the Continent as well as from Britain. (In later years, nurseries imported boxwood until quarantine regulations made that difficult.) Today hundreds of clones of *Buxus sempervirens* are in cultivation in the United States. The fast-growing kinds became known as American box; the slow-growing variety *suffruticosa* as English box; and the variety *arborescens* as tree box.

The species is extremely variable—fastigiate, prostrate, weeping, shrubby, or arboreal in habit. The leaves may be narrow to broad and rounded, notched or apiculate. They may be flat or bullate or twisted. They may remain dark green when exposed to the winter sun or become reddish or brownish. They may be variegated with flecks of white or yellow or have patterns of white or silver or gold against green.

Probably the most significant additions in recent years to the germplasm of *Buxus sempervirens* in the United States are the seedlings of Balkan origin grown by Edgar Anderson at Gray Summit, the Arboretum of the Missouri Botanical Garden. Some clones from these seedlings are in

In the formal garden of the Dean House, characteristic of restored eighteenth-century Williamsburg, dwarf box encloses the flower beds and tree box is clipped into fanciful forms, examples of topiary art.

Buxus microphylla koreana at the Blandy Experimental Farm in Boyce, Virginia.
About thirty of the plants are original thirty-year-old specimens; the smaller plants have been propagated from the larger ones.

the trade. Notable among these is 'Vardar Valley', a low-growing plant with bluish foliage.

More horticulturists should grow boxwood from seed. Seedlings in a single lot often vary. They make excellent standard plants, developing good root systems. Professor A. G. Smith Jr., of Virginia Polytechnic Institute, has grown more than five thousand seedlings, and certain outstanding ones have been selected for propagation. Plants of many clones fruit freely, and if leafmold is available and shade not too dense, population of volunteer seedlings will establish themselves. I have found such seedlings in abundance in old cemeteries and on old house sites in Virginia. Since flowering periods for the species and varieties overlap, natural hybrids might be expected.

A half century ago Sam Appleby raised boxwood seedlings near Baltimore, and among them appeared the very interesting *Buxus microphylla* var. *compacta*. This origination of 1912 and some of his other seedlings were purchased by Henry J. Hohman of Kingsville, Maryland, after Mr. Appleby's death. The plant was described by Rehder in 1937 as a "very compact, depressed-globose shrub broader than high, making a yearly growth of three-eights to three-quarters of an inch; the original plant reaching in twenty-five years the height of only ten inches by nineteen inches in width." At the suggestion of Dr. Donald Wyman, Horticulturist of The Arnold Arboretum, Mr. Hohman named the plant variety *compacta* and called it popularly the 'Kingsville Dwarf Boxwood'. He reports that it stands Canadian winters and is also doing well in the deep South. This slow-growing dwarf is a valuable plant, but it has three faults: it must be grown in the shade to be attractive (those of us who garden in shade will consider this a merit, not a fault); its brittle stems break off with a slight blow from a rake; and it throws sports which must be removed to preserve its compact habit and to prevent a sport from taking over altogether.

These sports make *B. microphylla* var. *compacta* interesting to the botanist. They suggest that var. *compacta* is a periclinal chimera, that is, that its different layers of tissue differ genetically, perhaps even chromosomally. The sports differ among themselves and are a source of clonal material. Mr. Hohman named a sport from var. *compacta* 'Curly Locks'

Another Hohman boxwood is 'Green Pillow'. This, one of Appleby's seedlings, is a slow-growing, compact plant with stiff branches. The foliage is green and coarser than that of var. *compacta*.

To emphasize the desirability of raising boxwood from seed, I cite some of my own marked variants. Among 1948 seedlings from open-pollinated *B. sempervirens pendula maculata* is a plant, seventeen inches high, with a marked

The leaves of three different kinds of boxwood; left, *Buxus sempervirens rosmarinifolia*, a very narrow-leaved form of the species, widely scattered through southern Europe, northern Africa, and western Asia; center, *Buxus balearica* from the Balearic Islands, Spain, and Sardinia, the leaves being almost two inches long in the warm climates to which this species is adapted; and right, *Buxus microphylla koreana*, a hardy, low-growing, spreading plant seldom two feet high.

A hedge of boxwood, from a good clone of *Buxus sempervirens*, extends along the sunken garden of the College of William and Mary in Williamsburg, Virginia. The sunken garden is about six hundred feet long, the boxwood about nine feet high. The small trees at the head of the steps are crape-myrtles, the larger trees beeches.

weeping habit and another, fourteen inches high, with a very open habit, while "sister" plants are four to five feet tall. Among six ten-year-old plants from open-pollinated *B. microphylla sinica* is a prostrate plant, only six inches high, which has a fine green color in winter. Among ten plants dated 1952, and raised as seedlings from open-pollinated *B. microphylla*, are two with especially fine bluish foliage. One of them has very small leaves. All these plants will in time furnish clones.

What are some of the choice boxwood representatives? Most growers would put *B. sempervirens* var. *suffruticosa* close to or at the top of the list. I also rate var. *myrtifolia* and var. *nana* (which came to me from Kew) very high; and likewise var. *salicifolia* which is particularly handsome when the plant puts on flushes of new leaves—the new shoots have twisted, feathery, light green leaves against the older, darker leaves. The Kingsville strain of weeping boxwood, *B. sempervirens pendula*, is magnificent, and I say the same for Kingsville var. *fastigiata*. These Kingsville box plants are vigorous, the foliage remaining dark green through the winter. My favorite variegated boxwood is *B. sempervirens* var. *elegantissima*.

(Continued on page 54)

Boxwood furnishes a background for tropical water-lilies in the reflection pool at Tennessee Botanical Garden, Cheekwood, at Nashville. The Botanical Garden has a fine collection of boxwood.

THE ALPINE HOUSE

By REX MURFITT

Mr. Murfitt, whose early training was obtained under the well-known English horticulturist W. E. Th. Ingwersen, is General Manager of Stonecrop Nurseries, Inc., in Cold Spring, New York. He previously lived in British Columbia for eight years, where he was a forest ranger in biology for the Canadian government.

THE ALPINE HOUSE was originally devised by European rock-garden enthusiasts who, as their knowledge of alpine plants broadened, desired to grow the treasures from the higher elevations under the trying conditions of their sea-level gardens. And among these gardeners those who live in or near cities also have to contend with industrial fall-out and the soot from many chimneys in striking contrast to the pure air of the lofty peaks.

The greatest enemy of alpine plants in the British Isles is rain and excessive moisture in winter. In their natural habitat these tiny plants are covered with a blanket of snow from early fall until late spring, with a more or less constantly cold, dry temperature. They are not harmed by cold, but they do need shelter from excessive or continual rain—so a permanent shelter from the wet was the original purpose of the alpine house.

It is placed in a light, airy location—neither wind-swept nor drafty—and away from buildings and trees. Thus situated, the alpine house furnishes all the fresh air the plants require without the rain. In England the alpine house is erected with the gable ends running north to south, so that the sides, facing east and west, receive the maximum sunlight. Ventilation is provided on both sides of the ridge, running the entire length of the house, as for conventional greenhouses; in addition, there are full-length side vents from the sill to the eave so that, when the vents are fully open, air can pass freely among the plants. Another device for ventilation, when it is too windy or too cold to open the vents, is the installation of sliding shutters on the walls beneath the staging. These shutters permit a change of air, extremely useful on a foggy day, since it is unwise to allow any moisture to form on the woolly foliage of some of the plants.

Problems facing the alpine gardener in the eastern United States are a little more complex, with high summer temperatures coupled with overpowering humidity and severe winter cold with alternating spells of freezing and thawing, not to mention the occasional ice storms just as spring growth commences.

Practically any existing greenhouse can be converted into an alpine house, provided it receives plenty of light and is not overshadowed by tall trees or situated on the dark side of a building. Additional ventilation will have to be supplied—full ridge vents and side vents, the wall shutters are not essential—to ensure admitting fresh air and every possible breeze through the alpine house during the muggy days of July and August.

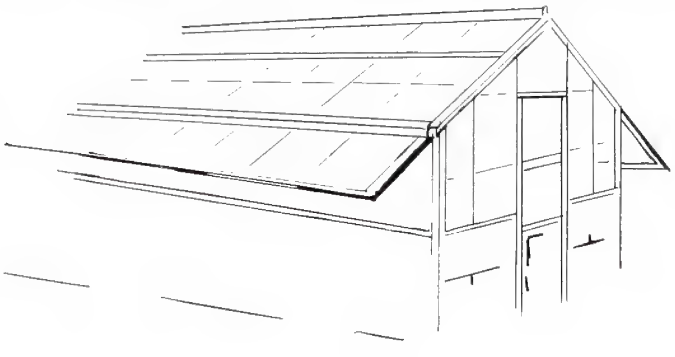
Some form of summer shading must be installed; there is no need, of course, for shading in the early evening or in dull weather. Roller lath on the outside of the structure is ideal, since it can be controlled with comparative ease. The blinds can be pulled up as necessary, so the plants will not draw from lack of light. Panels with lath nailed one inch apart and resting on the glass are very effective, but the panels must be securely fastened down. A sudden windstorm could be expensive because of much broken glass. Some of the newer saran materials are excellent for roller blinds or panels; since these materials are so light, the wooden frames can be of light construction. Finally, there is the old stand-by form of shading, that is spraying a tinted compound on the glass. However, the outside blind or panel techniques are the most effective, because they break the sun's rays and help to keep the house cooler.

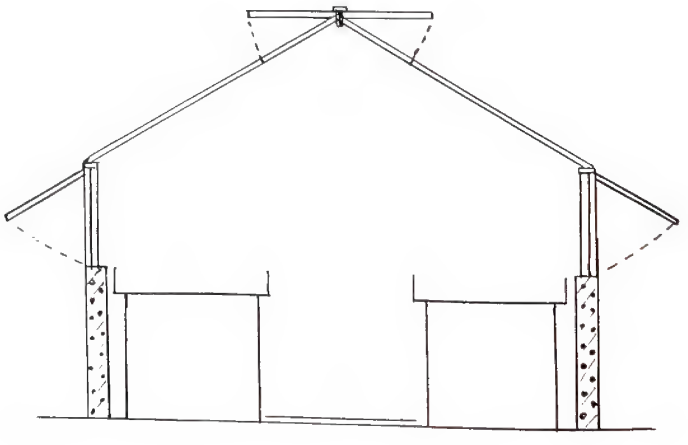
Winter heat will have to be provided in order to stabilize the temperature and keep the atmosphere from becoming damp. The ideal winter temperature is approximately 35°. During continuous freezing periods, when the heat is running through the pipes, the plant pots will become dry, especially those standing near the pipes. They should not be allowed to remain dry too long. On a bright day, when the temperature is above freezing, this condition should be remedied by watering, the soil in the pots being thoroughly moistened.

The staging can be the usual greenhouse type, provided

Below. The alpine house with the side ventilators in open position, the top ventilators closed.

Right. The alpine house with extra ventilators in open position.





Soldanella montana.

Cyclamen ibericum roseum.

it is sturdy and an inch or so of pea-gravel spread evenly over it. This gives the water a chance to drain from the pans; it is also a successful method of keeping the bases of the pans cool. An alternative method, especially for the gardener who has to be away during the day, is a boxlike bench filled with sand or fine gravel in which the pans can be plunged to their rims. This method conserves water and looks very attractive, but does make moving the pans around a little more difficult. And it seems as though plants are continually being re-arranged!

Plants are usually grown in clay pans, the kind used for azaleas and bulbs, the size being determined by the size and vigor of the plant. Some gardeners may not like pot culture of plants, since it is time-consuming and does require constant attention to produce satisfactory results. But to others this would be the whole concept of the alpine house—to be able in the evening to check for dry pans, pot or repot, do a little weeding, or perhaps take a few cuttings.

The construction of a small rock garden within the alpine house is a happy solution. This garden would have to be built on a base of blocks, preferably a dry stone wall, if available, or on an extremely sturdy bench. This enables one to elevate the rock garden to waist level for easier viewing and much easier maintenance. The crevices in the sides of the walls of this base can be planted, too. Miniature cliff gardens can be built at the gable ends on each side of the door—one for shade-loving plants, the other for sun-lovers.

When it comes to the actual potting of plants, a few basic rules should be observed:

1. Never overpot a plant, for this will mean more soil than the plant can use, and the soil will become sour before the roots reach into it. Select a pot which fits the roots just comfortably; the plant can be transplanted as its roots exhaust the soil of the present pot.
2. Soak the pans in water an hour or so before they are to be used, for this will prevent the pans from absorbing water from the soil and thus robbing the plants.
3. Extremely good drainage is essential. One large piece of broken pot placed over the drainage hole and a layer of small pieces over it, then about one-half inch of coarse peat to cover them, will keep the soil from washing down and blocking the drainage.

A selection of pans is desirable; four-, six-, seven-, and ten-inch pans will cover most needs.

While some plants have different soil requirements, a stock mixture of one part of topsoil, one part of peat, one-half part of coarse sand, and one-half part of one-eighth-inch crushed rock, will be suitable for most.

Spring, when the plants start root activity, is the best time for the major potting program, although potting can be done at any time if the plants are firmly planted and not allowed to become dry. During sunny spells they should be carefully shaded until they become established.

One of the most fascinating sights in the alpine house is the rounded, almost mosslike cushion formed by some high alpine plants. A well-known British authority refers to them as "buns"; one of his alpine houses, devoted entirely to them, is known as "The Bunnery." They are the Aretian androsaces and drabas, including the popular *Androsace pyrenaica* and *A. helvetica, Draba polytricha,* and *D. mollissima.* These tiny plants should never be over-

Saxifraga burseriana 'Gloria'.

Thymus membranaceus.

potted; they must be well rooted around the pot or pan before being moved into a slightly larger one.

The number of plants to be placed in a pan depends on the habit and rate of growth. Strong-growing plants do best if potted singly. Several plants of creeping habit or of sturdy, upright growth can be potted in a large pan; their appearance is enhanced by wedging an attractive piece of rock among them. Finally, a topdressing of gravel finishes the whole miniature landscape to perfection. This gravel topdressing has some useful purposes besides its aesthetic value, keeping the soil from caking, conserving water, and preventing decay from passing from the soil to the plants.

Miniature spring-flowering bulbs can be planted very close together—twelve to eighteen corms of *Crocus* species, for example, in a seven-inch pan, while *Iris* species need a little more room to expand their broad, delicate flowers.

Dwarf trees and shrubs are an integral part of an alpine landscape, and the alpine house must include several. Their pleasing shades of green are refreshing in any season, and their different shapes and sizes add variation to the otherwise flat pattern of the benches.

The saxifragas are ideal alpine-house plants for the American gardener. The cushion (Kabschia) saxifragas are a delight in early spring, their silvery mounds resplendent with bright "jewel" flowers on slender, red stems. The rosettes of the encrusted (Aizoon) saxifragas are heavily coated with silver, intriguing even in winter. In late spring

Plant	Flowering Period	Color
Alyssum spinosum	June-Jul.	white
Androsace chamaejasme	May	white
cylindrica	April	white
sempervivoides	May	rose-pink
Armeria caespitosa	May	pale pink
Asperula suberosa (*A. arcadiensis*)	June-Aug.	pink
Campanula aucheri	May-June	blue
clatines	July	deep lavender-blue
Cyclamen atkinsii	January	rose-red
atkinsii album	January	white
cilicicum	September	pink
coum	January	rose-pink
neapolitanum	September	rosy pink
repandum	March	crimson
Dianthus alpinus	May	deep rose
neglectus	May	pink, buff reverse
nitidus	May-June	rose
Douglasia laevigata	May	rose
Draba aizoides	April	yellow
mollissima	April	yellow
polytricha	April	yellow
rigida	April	yellow
Erigeron aureus	July	yellow
Fuchsia pumila	Aug.-Sept.	scarlet
'Tom Thumb'	Aug.-Sept.	crimson and purple
Geranium farreri	June	pale pink
cinereum var. *subcaulescens*	June-Jul.	carmine
Helichrysum frigidum	Jun-Nov.	white
selaginoides	Jul.-Sept.	white
Iberis pygmaea	May	white
Iris lacustris	May	blue
Lewisia cotyledon	May	salmon-rose
Morisia monantha (*hypogaea*)	April-May	yellow
Myosotis rupicola	May	blue
Origanum dictamnus	Aug.-Sept.	pink
hybridus	Aug.-Sept.	pink
Penstemon rupicola	May	crimson
Petrocallis pyrenaica	May	lilac
Polemonium confertum	May	blue
Polygala calcarea	May	blue
vayrediae	May	rose
Potentilla nitida	May	pink
Ramonda nathaliae	May	lavender-blue
Saponaria caespitosa	May	pink
Saxifraga burseriana		
crenata	Feb.-Mar.	white
'Gloria'	Feb.-Mar.	white
sulphurea	Feb.-Mar.	primrose yellow
'Cranbourne'	Mar.-Apr.	pink
'Faldonside'	Mar.-Apr.	primrose-yellow
jenkinsii	Mar.-Apr.	lilac-pink
cochlearis	May	white
cotyledon	May	white
'Kathleen Pinsent'	May	pink
Sempervivum ciliosum	July	yellow
erythraeum	July	red-purple
Silene acaulis	May	deep pink
Thalictrum kusianum	June.-Jul.	rosy lavender

Saxifraga cochlearis probinii.

the flowers arch out on graceful stems, some a foot or more long.

Dwarf cyclamen thrive in a large pan, extra leafmold and sand being added for best results. *C. coum* flowers in winter, *C. repandum* in spring, *C. europaeum* in summer, while *C. neapolitanum* and *C. cilicicum* give color in the fall.

At least one pan of Mt. Atlas daisies, *Anacyclus depressus,* should be grown, for they require so little attention to encourage them to produce their flowers nearly all the year round. The houseleeks or sempervivums are rewarding plants, quickly establishing themselves in only a few inches of soil. They are useful for making little rock gardens in pans or for planting directly in crevices. Sempervivums are most appreciated in the winter months, by which time they have formed tight rosettes, like little balls perched on the soil-level, and have taken on their bright red and purple colors. To enhance this effect they should be kept a little dry from early fall through winter.

The campanulas or bellflowers, which suffer from summer heat in this area, are much happier in the cool of the alpine house. July into August is their flowering period. A good selection is *C. elatines, C. cochlearifolia,* and *C. wockii.*

The accompanying brief list of plants, suitable for the alpine house, indicates flower-color and approximate blooming period.

ARBORDALE

ABOUT TEN YEARS AGO, the Morton Arboretum began to consider some type of housing for its employees. Many suggestions were brought up and rejected until the idea of making this project educational as well as functional occurred.

A competition for house designs was also proposed. Plans were laid, rules formulated, prizes established, and the contest became a reality. There was a strong response to the stimulus of this contest; some two thousand entries were received from architects in many other countries as well as in this country.

A panel of judges, composed of members of the American Institute of Architects and the Trustees of the Morton Arboretum, was appointed to select seven contemporary houses as the nucleus of Arbordale. Later it was decided to include a number of traditional as well as contemporary structures.

The staff of the Morton Arboretum, conscious of the value of displaying plants properly, stressed the importance of landscaping the property to add to the educational potential of the project.

The site is relatively level, about seventeen acres in extent, and is situated in the Arboretum on the west side of Illinois Route 53 and north of the Illinois East-West Toll Road. To the south of the site is a thirteen-acre, man-made lake which resulted from borrowing fill for the construction of the toll highway. The area is serviced with paved streets, gas, sewer, water, and underground electrical and telephone facilities. It is separated, in a sense, into two sections; one of contemporary and one of traditional dwellings. The lots average about one-half acre and provide adequate living space for each family unit. A community play area and garden areas are also part of the development, which now contains twelve homes with an ultimate number of twenty-three.

The first actual landscaping was undertaken in late April, 1959, construction having been completed late the previous year. The landscape planning was done by Morton Arboretum's staff, with Anthony Tyznik responsible for the landscape design of the entire project.

As an arboretum function, Arbordale's primary purpose is, of course, the housing of its employees. Its secondary purpose is to display plant material in relation to good landscape design, and its third purpose to serve as an educational facility for the student of landscape design, the architect, nurseryman, and property owner. The Arboretum is thus able to promote many elements and facets of landscape and architectural development, which it believes to be sound in theory, but of which it has heretofore lacked sufficient factual data to make effective. The Arboretum aims to further this program through lectures, field trips, labeling of plants, and eventual distribution of printed information on initial costs, sizes, spacing, and planting methods.

The fourth objective is the display of compatible architectural features as they relate to the house and as they complement plant material. It is here that the use of patios, curbing and mowing strips, fences and walls for privacy, and protection, plant containers, and the like will be demonstrated.

Through the fifth phase the Morton Arboretum hopes to promote research in various landscape design areas, such as de-emphasizing legal boundaries to facilitate a continuity of space impressions, thus eliminating the "caged" sensation of many suburban developments and stressing the importance of interdependence on properties by all members of a community; developing the pleasant appearance of streets by placing trees so as to emphasize the approach to and composition of the residence; employing artificial lighting to create shadows and patterns on plants and structures,

Top row, left, a street in the contemporary section of Arbordale; right, the front of a contemporary house, showing semienclosed patio. Bottom row, left, the rear patio and garden of a contemporary house in Arbordale; right, espaliered shrubs and picturesque trees in this contemporary landscape planting.

and on such varied surfaces as stone, water, glass.

As a public function, Arbordale, it is hoped, will be able to aid the interested individual in selecting the material and creating his own landscape composition. This will be accomplished by affording a real situation for the study of trees, shrubs, vines, groundcovers and their individual characteristics of growth-habit, growth-rate, size, texture, foliage, flowers, fruits, and other seasonal attributes; and for the observation of applied landscape design, that is, the relationship of the individual property landscape to the landscape of the whole development.

Among other anticipated educational features will be the display of new or less-known desirable plants to stimulate interest in their use. This in turn may create greater demand for such material with the result that nurseries may find it worth while to raise the plants in adequate quantity. Too often the home owner, the designer, and the nurserymen are stagnate, tied to traditional plants nursery-wise, so that landscape composition fails to keep pace with up-dated architectural trends.

Although Arbordale is not yet a complete and mature living unit, it has already accomplished a number of things and will continue to accomplish more as time passes. Within four years treeless prairie cornfields have been transformed into a substantially comfortable, attractive development through planting large shade trees and nearly mature shrubs, wherever screening became necessary, and through the judicious use of walls and fences where they were more practical.

A large variety of plants has been used to demonstrate their desirability and their adaptability to home landscaping. Unity has been achieved through repetition of the same or similar forms throughout the entire seventeen-acre tract. A carefully planned continuity of contour and space also aids in attaining unity.

Arbordale has been conceived to serve the public, as do other facilities of the Morton Arboretum, and the Trustees and staff are confident that the unique innovation will be successful in this respect.

BOXWOOD (Continued from page 49)

Buxuc microphylla from China, Korea, Taiwan, and Japan is just as variable as *B. sempervirens*. The plant that typifies the species botanically—because it was the first described and named—is native to Japan. It was introduced into the United States about 1860 and is one of the hardiest of boxwood. Plants of the clone that is usually grown become reddish in winter, though certain of my seedlings do not. The leaves are small, giving the plant a neat appearance. The flowers are exceedingly fragrant. Seedlings of this phase of the species exhibit wide variability. Some plants have leaves smaller than the type, and these may be lustrous green, green, or blue-green. Some of the small-leaved plants with bluish foliage will most likely become important. We have only begun to discover the usefulness of this segment of *B. microphylla*.

Buxus microphylla var. *japonica* was introduced at about the same time as the type of the species. It has completely glabrous shoots, yellow-green leaves, is not especially attractive, and not generally useful. It would seem, according to the literature on the subject, that the plants usually

designated var. *japonica* in this area are properly referred to var. *sinica,* which has pubescent branches.

Buxus microphylla var. *sinica* was brought to this country about the turn of the century. This boxwood is from China, where it is a favorite in gardens, and is just about as variable in habit and foliage as *B. sempervirens.* Several clones of var. *sinica* are grown in this region, and all are satisfactory. They are vigorous and withstand adverse conditions, although those in the sun often become discolored in winter. In the sixty years since its introduction to America var. *sinica* has taken on a very important role. It might well be used as a screen to a height of twenty feet along streets, serving as a buffer against street noise. It is used in quantity at the College of William and Mary for hedges.

Buxus microphylla var. *koreana,* which was introduced into this country in 1919, grows to about twenty inches high, and is a very hardy, attractive, and useful plant. I am acquainted with only two clones in the trade.

Buxus hardlandii is a most effective plant. It has shining green leaves, 1¾" by ⅜". I know two clones; one with a notched leaf, the other with a rounded leaf. The latter came to me from Kew as *B. nepalense.* Rehder and Wilson state: "This curious species is abundant in the gorges and ravines near Ichang (China) growing in rock-crevices and among stones in the bed and banks of streams where during summer floods it is submerged. It is found only at low altitudes where the winters are very mild and would not be hardy in northern temperate regions." I recently obtained a plant of this species labeled 'Richard' with a deep V-shaped notch in its leaf. The usual clones do well in Williamsburg. They are the earliest box to put on new growth in the spring, hence are frost-pruned nearly every year. I have two plants which are about fifteen years old and are now thirty inches tall, forty inches broad, and flat-topped; these very striking plants flowered and fruited for the first time in 1962. *B. harlandii* seems to be easier to propagate vegetatively than *B. sempervirens* and *B. microphylla,* though cuttings of all these boxes readily root.

About ten years ago I got cuttings from Kew of *B. balearica* and of *B. wallichiana.* I was not successful in rooting the latter, and only one cutting of the former struck. It has proved to be hardy, but it is only ten inches tall, strangely stubborn growth for a plant which might reach a height of seventy feet. We need to give further attention to these two species of *Buxus.*

OBSERVATIONS ON HARDINESS OF ROSES IN LOW-TEMPERATURE WINTERS

By R. W. Oliver

Mr. Oliver was Ornamental Horticulturist with the Plant Research Institute, Canada Department of Agriculture, at the Central Experimental Farm, Ontario, until his retirement in 1963.

EFFORTS TO FIND a simple solution to the problem of winter damage to hybrid teas and, to a less extent, other classes of roses, have not been successful. So many factors are involved that no simple method has been found—almost all cultural practices here must be directed toward encouraging the wood to harden before winter.

There are, of course, definitely hardy species, such as *Rosa acicularis* and *R. rubrifolia,* which will come through the winter successfully without protection. The June-blooming *R. gallica, R. harisonii,* and *R. moschata* are fairly sure to survive. These, however, do not meet the demand for continuous bloom of high quality.

In modern garden roses the characters of continuous bloom and high quality are inherited from *R. chinensis,* which originated in a southern climate where winter is not severe and where the wood does not need to harden before winter sets in, to withstand the shock.

Plant breeders have been striving to combine hardiness and continuous bloom; Sven Poulsen of Denmark, William Kordes of Germany, and Walter Brownell of the United States have been among the most successful in this endeavor. During the last ten years we have tried many of their hybrids in Ottawa. The percentage of casualties in these varieties is lower than that in other hybrid teas, but quality of bloom has been lost. Kordes' 'Ile Habaland' and 'Margarethe V. D. Mandare', 'Poulsen's Bedder' and 'Poulsen's Pride', and Brownell's 'V for Victory' and 'Pink Princess' have proved reasonably hardy and are also continuous-blooming varieties, but all are below what we expect in quality of flower.

Continuous bloom depends on continuous growth through the summer; and when growth continues, tissues do not naturally go through the hardening process that is so necessary to withstand the shock of sudden drops in temperature. Since this hardening does not occur naturally to a sufficient degree in the wood of hybrid tea roses, the gardener has to regulate cultural practices in order to check growth.

Fall growth can be discouraged by:

1. Reducing the fertilizing, particularly with nitrogen, after the first of July. High nitrogen in spring, through the application of three to four pounds of 10-6-4 fertilizer to every one hundred square feet, seems to start plants into vigorous early growth. As soon as bloom buds have formed in June, we have used 4-8-13 fertilizer, and more recently 5-10-15, at the same rate. When fertilizer has been applied in midsummer to encourage later bloom, the roses have continued vigorous growth in October.
2. Reducing the water supply to the minimum that will keep the foliage from wilting in dry weather. Here in Ottawa we usually have plenty of natural precipitation in late August and September so that control by watering reduction is possible only during dry weather.
3. Mulching with raw organic matter, such as chopped straw or granulated corncobs. The bacteria that cause decomposition of the mulch use available nitrogen from the soil, thus reducing the supply of nitrogen to the plant.
4. Cutting blooms with shorter stems toward the later part of the season. The production of soft new growth is thus not encouraged.
5. Spraying to keep foliage free from pests and diseases throughout the season. This prevents defoliation in midsummer and the production of second growth which would leave the bushes in a susceptible condition.

We have found the following combination-spray to be satisfactory: To 100 imperial gallons of water are added:

Dithane Z-78	2 lb.
Karathane	¾ lb.
50% wettable D.D.T.	2 lb.
Lindane	½ lb.
Aramite	1 lb. (for mites only)

The hardiness of roses seems to vary with the root-stock on which they are budded. Those budded on *R. canina* slow down in fall more easily than those budded on *R. multiflora.*. The summer performance of those budded on *R. canina,* however, does not seem to be so robust nor blooms so plentiful as those on *R. multiflora.*

The last defense is mechanical protection against wind and sun rather than against extremes of cold. Though we want to conserve moisture within the plant, surrounding it with moist material is not the way to accomplish this end. Moisture-laden material is poor insulation, and it encourages the development of fungous disease such as mildew and canker. Snow is the best insulator but, unfortunately, is not available in open winters.

In this region, soil should be mounded to a height of eight to ten inches to protect the base of all hybrid tea, hybrid perpetual, floribunda, and climbing roses. It is better to bring extra soil to the beds rather than scrape it from among the plants, thus exposing their roots. (Experimental work here in the past has shown that sawdust, sand, moss, vermiculite, and other mulching materials are not so good as soil.) Mounding the soil should be done before the ground freezes in early November, but where further protection is necessary, it should not be provided until after the ground is well frozen and field mice have found winter quarters elsewhere. Some of the commercial compounds for the specific purpose of deterring rodents can be used to keep mice under control.

Straw and leaves piled over the tops of roses tend to pack into a soggy mass which freezes and encourages smothering and fungous problems. Spruce and pine branches trap snow effectively and provide good insulation.

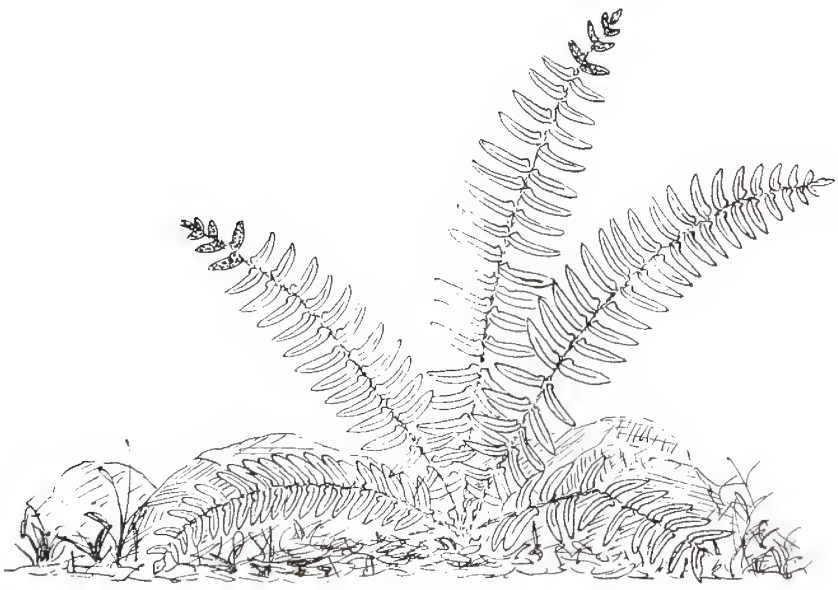
Fiber-glass and rock-wool insulation blankets without paper backing, which were wrapped around the tops of the plant and tied firmly in place, proved effective in a two-year trial. They are quite expensive, however, and the fibers are irritating to the skin of some people.

So far the most satisfactory protection under winter conditions in this locality has been A-shaped wooden covers with closed but perforated ends, which are installed after the soil has been mounded. While the initial cost is high, the covers last several years and can be handled and stored easily.

For those who live in really cold areas where —30°F is not uncommon, it is advisable to dig roses each fall and hold them over the winter in a trench, the bottom of which is covered with straw. Soil is then spread over the plants, and boards placed over the trench to shed moisture. Even the hardiest climbers need to be taken from their trellises, tied in a loose loop, and covered with the inverted troughs mentioned above.

Tossing his mane of snows in wildest eddie's and tangles,
Lion-like March cometh in hoarse, with tempestuous breath,
Through all the moaning chimneys, and 'thwart all the hollows and angles
Round the shuddering house, threating of winter and death.
But in my heart I feel the life of the wood and the meadow
Thrilling the pulses that are kindred with fibres that lift
Bud and blade to the sunward, within the inscrutable shadow,
Deep on the oak's chill core, under the gathering drift.

WILLIAM DEAN HOWELLS



PLANTS
Make Patterns

By ALICE DUSTAN KOLLAR

Mrs. (Samuel) Kollar is Garden Editor of the *Newark Star-Ledger*, author, lecturer, and landscape consultant, and frequently conducts a garden workshop.

The American gardener traveling abroad is always impressed by the dramatic effect of French patterned gardens.

The framework of these formal gardens consists of boxwood or some other hardy, usually evergreen, edging. The colorful fillers which compose the "carpeting" are tender plants selected for their related sizes, textures, and colorings. Sometimes fragrance is added, the French favorite for this purpose being heliotrope.

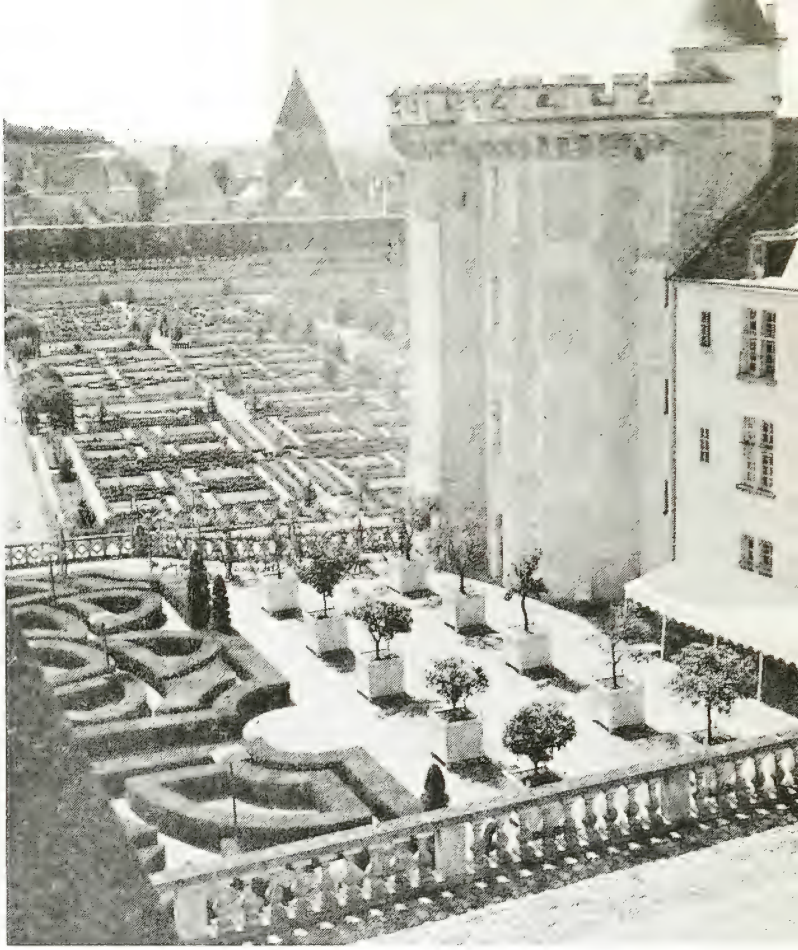
The best season to see these traditional plantings which decorate parks and chateau grounds is from midsummer through early fall. During this period the plants used for carpet bedding are at the peak of perfection.

The strategic location of many a French patterned garden gives the chance to dook down on it—from doorway, window, terrace, or stairway. While usually planted on level ground, carpet bedding is occasionally developed on a slope of the proper angle to be observed from a walk, as in the public park in le Puy, or from a window, as at the chateau of Langeais.

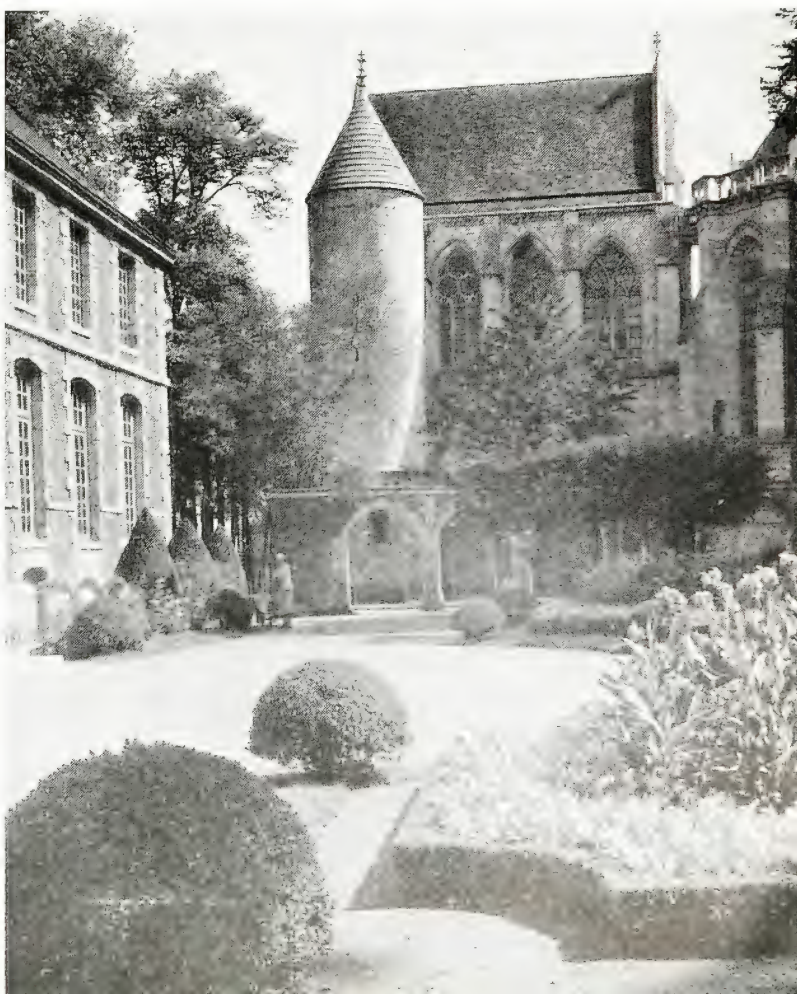
Often the patterned garden may be enjoyed from several levels and from different angles. As the viewer approaches from a distance, the details unfold gradually, until individual plants are apparent.

Thus the gardener who photographs finds herself shooting countless pictures of a dramatically situated garden, as that below the museum building (palace of the Berbie) in Albi, or of an extensive layout, as that beside the chateau of Villandry.

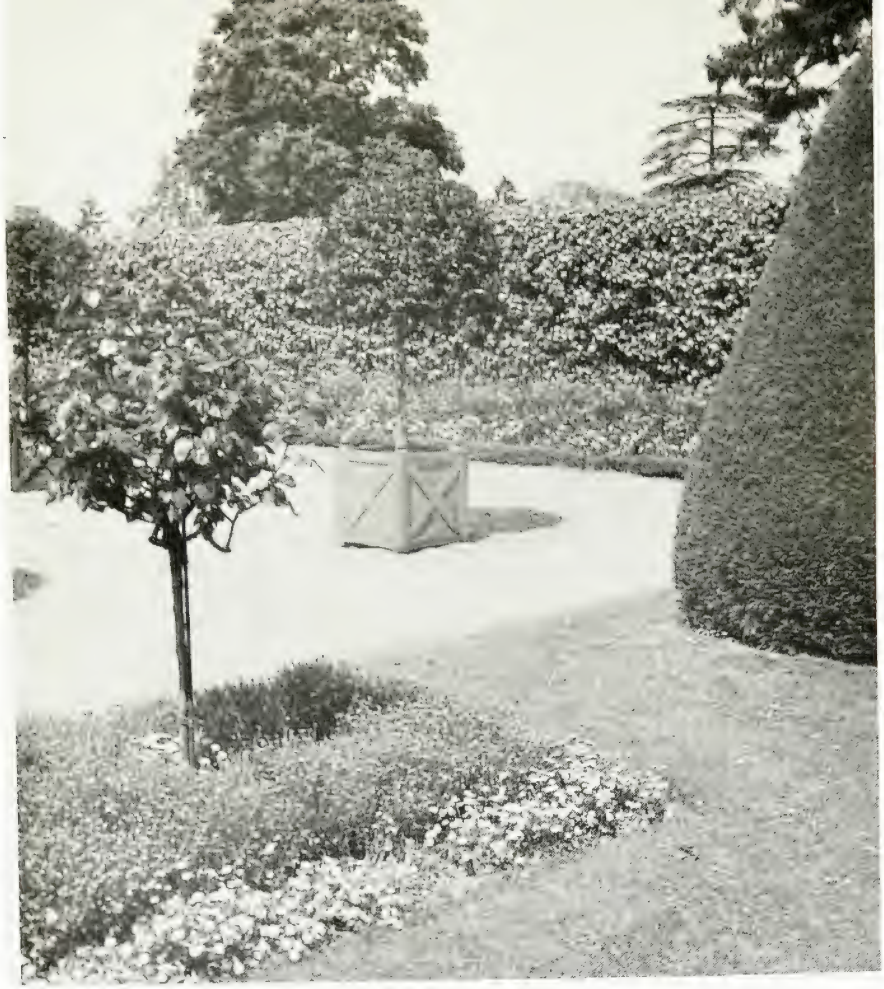
While carpet bedding may be too costly and stiff a style to adapt to landscapes on this side of the Atlantic, American gardeners cannot fail to appreciate its fascinating combinations, laid out in mathematical precision and maintained to perfection.



From a terrace beside the chateau of Villandry, the visitor may gaze across the extensive and intricate patterns of the sixteenth century gardens. In the foreground, sheared boxwood edgings have accents of topiary yews. Beyond is the kitchen garden.



Behind Chartres Cathedral a courtyard includes a small garden. Silvery dusty miller edges a mass of red salvia which glows like stained glass in the late afternoon sun. A round tower of St. Pyat chapel is also caught by the slanting rays.



The approach to the chateau of Malmaison, which was the favorite residence of the Napoleon Bonapartes, is through a flower-edged courtyard. In June the visitor enjoys standard roses underplanted with forget-me-nots and English daisies, and pansies edging wallflowers. Tubbed bay trees and sheared yews stand at regular intervals. Empress Josephine's famous rose garden lies beyond the wall.

This charming garden is glimpsed from steps beside the palace of the Berbie in Albi, southern France. Of butterfly-like design, it may be enjoyed also from the vine-covered walk, opposite, which tops a fortress wall high above the Tarn River.

This intricate bit of carpet bedding in the park of le Puy, picturesque pilgrimage city in central France, has been developed on a slope topped by a planted urn. From the adjacent path the passerby identifies the bedding plants as dwarf marigold, wax begonia, bloodleaf and two kinds of coleus, while canna and petunia decorate the fruit-and-medallion-studded urn.

In Tours, French hydrangeas fill a round bed in the shade of tall trees and, nearby, a large pink azalea blooms in a tub. This attractive little park is adjacent to the plaza of the railroad station, from which busses leave to visit the chateaus along the Loire River.

Beside the chateau of Ucel, Mediterranean cypresses form an arch, and sheared lavender-cotton alternates with pebbles to form a pattern of squares. Located in the Ardèche region of southern France, this hillside garden was developed by the present owners of the chateau who gained inspiration from travels through Spain and Portugal. Two of the garden features are a star-shaped pool and a wall fountain surfaced in shells.

A patterned garden being planted by the head gardener and a workman at the base of a tree on the spacious grounds of St. Germain-en-Laye near Paris. Plants are spaced according to a plan made to scale, then set by dibber or trowel into well-prepared soil.

CONVERSATIONS ON ECOLOGY VIII

Virginia Weadock, M.S. (Mich.), is a research assistant at The New York Botanical Garden, and the Editor of *Sarracenia*, a periodical devoted to the various phases of biogeography. Having grown up in the Sleeping Bear country of Michigan, to which she returns every summer, she has been a careful witness of nature conservation in that part of the country. She has collaborated with several botanists whose interests are very close to the purposes of vegetation management.

THE NEW YORK BOTANICAL GARDEN
New York
January 5, 1964

Dear Dr. Leopold:

Several statements in your recent letter to Dr. Dansereau[1] are of interest in their application to a problem of great concern to me. I may seem to stray a bit from the topic of vegetation management in dealing with this subject, but I hope eventually to prove its relevance.

A constant worry among conservationists is the encroachment of "civilization" into our remaining wilderness—in some sections of the country natural areas have been established to preserve samples of our valuable heritage. But there is an increasing demand (in some circles) for outdoor recreation sites, and many planners hope to use the remaining undeveloped lands for this purpose, often looking to the National Park Service for help in creating such facilities.

In the past few years several bills have been introduced in Congress, all calling for the establishment of national seashores or lake shores, new categories in the park system. According to a statement at the Senate Subcommittee hearing[2] by Dr. Stanley A. Cain (a conservationist), the "units of this . . group have outdoor recreation as an important purpose in their establishment." Many choice sites are now under consideration for future seashores (otherwise known as recreation areas) to be set up on this principle of multiple-purpose use as opposed to the stated limited-use plan of the national parks, i.e., to preserve the natural scenic features "for the pleasure of the public."

Let us look for a bit at this subject of recreation (or "tourism") which covers a vast array of activities from hiking to camping, from fishing to bird-watching, from sports to spectator-sports, from "scenery-looking" to "people-watching" at amusement parks, beaches, or resorts, ad infinitum. An editorial in the *IUCN Bulletin*[3] states that ". . . tourism in many countries is now the predominant industry . . . It has created a whole network of world communications through which millions of people pass, escaping from boredom . to seek distraction . . . pleasure, but for the most part achieving frustration, irritation and exhaustion . . . Tourist droppings are being splattered across almost every delightful place. Contemplation and meditation are impossible, hence pleasure and understanding are unattainable. The main objective becomes a mad rush to accumulate impressions, acquire mass-produced souvenirs, and desperately strive to retain an image or two for future remembrance or for showing off to friends at home." Isn't this exactly what is happening in many of our so-called tourist attractions such as national parks, scenic sites, monuments, etc.? I know that not all recreation seekers fit the above description, but the percentage will grow as more leisure time becomes available to people who never had it before. The *IUCN Bulletin* editorial adds: "This relentless pressure of tourism . . is systematically destroying, by sheer numbers and by the amenities that numbers imply, that which is rightly called the natural heritage of a nation."

The automobile makes it easier for people to cover more territory in less time and in less depth. Many urbanites (for whom these recreation areas supposedly are being prepared) have no background of vacationing, no training for the outdoor life, no instruction in using camping, sporting, or boating equipment, and, worst of all, they don't realize the necessity of such knowledge. I wonder if increased camping and/or wilderness sites are really what today's (and tomorrow's) sophisticated vacationer is looking for? Isn't mass-camping going to become passé in another ten years or so when some other type of recreation becomes "IN"?

One by-product of increased tourism is the growing percentage of people who wreak havoc on property of all categories (public and private). In many of our city parks it is no longer safe for *any* individual to wander alone and enjoy the scenery and serenity. This trend will soon be felt in the national parks and seashores. Granted that only a small percentage of visitors is guilty of such behavior, even a few can make life miserable for the many. An assistant regional forester of the southern division reported[4] that five per cent of visitors to the National Forests were destructive, and another twenty per cent were bothersome and a nuisance to rangers and other campers. These are the uneducables, the ones who sense no responsibility to neighbors, to nature, to property. There is no legal or democratic way to deny these people access to public facilities; but why, in creating more public sites for them to invade, do we have to surrender our most valuable natural areas?

Increased littering is another offshoot of tourism; the Michigan highway department reported its costs are up twenty per cent over last year's figures for litter cleanup. The national emphasis now concentrated on "litterbugs" is a sad commentary on the behavior of our citizens; NPS has started an anti-litter campaign, cities and states post signs and assess fines, judges mete out sentences to offenders by making them clear up stretches of highway. Some of these measures are effective to a certain extent, but in the long run our country is losing its charm and its value because of irresponsible citizens. The more land we open up for recreation, the more litter there will be to collect. NPS has neither the money nor the personnel to clean up after tourists. I heard one report from Cape Cod National Seashore that vandalism is up one hundred per cent since the area opened, and that it takes a week to clean up after each weekend's onslaught of tourists!

NPS conducts an admirable series of nature study courses at all its parks, but the percentage of visitors reached is small—and the ones who most need to be educated never

are! Children may be exposed to nature study courses, but as long as parents' behavior is imitated by their offspring, little progress can be made in the right direction. By the time this trend could be stopped, all of our recreation areas might be ruined as far as vegetational features are concerned.

Now, a bit of detail about one project for which I have some personal knowledge and interest. The National Park Service's proposal to establish a national recreation area in Benzie and Leelanau Counties of Michigan was first introduced to Congress in June, 1961. In succeeding bills (in 1962 and as S-792 in 1963) minor revisions were made in response to citizen complaints, but NPS still desires at least seventy-seven thousand acres (and Secretary Udall would like to have ninety-two thousand) containing dunes, forests, plains, lakes, rivers, farms, orchards, homes, resorts, small businesses.

The citizens had no prior knowledge of this measure, a fact which was not well received in the affected area. Here is an example of the lack of communication, mentioned by Dr. Frank E. Egler,[5] between knowledgeable parties and the general public. Intermediaries mishandled scientific (or pseudo-scientific) information and, in effect, tried to ram the plan down the public's throat by assuming that the populace would welcome with open arms anything suggested by the government. I learned later that the unpublicized request for NPS appraisal of the Sleeping Bear Dunes region had been made by the Michigan Natural Areas Council, which group, apparently, is not bothered by the over-all emphasis on recreation!

Theoretically, property owners could keep their developed land, subject to as yet unspecified zoning regulations, or they could opt to sell to NPS. National Park policy has always been to eliminate inholdings as soon as possible (see Footnote 2, p. 140); in the seashore proposals this does not hold true, so they say, but the bill gives great power to the Secretary of the Interior, especially the final say on who has violated zoning rules. Thus, the acquisition of inholdings might be accomplished easily.

National Park Service wants to acquire this region as part of the "Save our Shorelines" program[6] because it encompasses a physiographic unit (resulting from Pleistocene glaciation) of moraines, dunes, drainage channels, hill and swale topography, etc. NPS gives passing mention to the interesting plant associations and says that the whole area would be good for ecological studies. (Some botanists have known this since the turn of the century, but unfortunately few have done anything about it!) The brochure then asks: "The bounty of nature calls to be used and will be used, but how and by whom? And in the using what will remain of the gift?" NPS answers this by proposing a national lake shore providing recreational facilities for an estimated million-plus tourists annually!

As a long-time resident of this area, and as a botanist, I use this same question as a basis for arguments against S-792 and similar bills: ". . . but how and by whom . . and what will remain . . ." I wonder just what will remain a few years from now even if only half of the estimated tourists invade the park. Whereas the planners see the area as it is *now*, with its charm, its tranquillity, its scenery, its scientific worth, I can envision the havoc which will ensue as a result of its being made available for mass tourism.

Superficially this legislation may look good, and botanical and conservation groups have backed it because they think this is the only way to prevent the loss of valuable scientific terrain to the real estate subdivider. I maintain, however, that a national lake shore is not the only way and, in fact, might be the *worst* way, to preserve our valuable heritage, because recreation cannot be equated with preservation. Yet S-792 in only three small paragraphs (or parts thereof) mentions preservation of the scenic and scientific (in that order!) features of the lake shore; this provides a good example of the current thinking in NPS. Buffer zones are proposed for developed property (*not* for scientific sites), but this is pure platitude because some tourists cannot be "buffered out" in spite of regulations, signs, or fences. NPS itself has already found that mass-recreation is detrimental to conservation and therefore urged passage of the Wilderness Act to preserve parts of the western parks from permanent damage.

You, Dr. Leopold, speak of short-term profit versus long-term benefits and suggest that we should weigh our future against our present. In opening up vast areas of our remaining natural features primarily for recreation, I wonder if we are really protecting our future. I have been accused by the president of the Michigan Parks Association of being a preservationist rather than a conservationist, and perhaps it is true. The concept of conservation over the years has encompassed the wise use (and replacement where possible) of our natural resources. In some instances this concept, of necessity, has been narrowed to preservation alone where "use" has proved detrimental to certain species of plants, animals, and wildfowl. I see a fallacy in the theory of multiple-purpose use in the proposed (or existing) national seashores, because some of the areas under consideration contain species and/or ecosystems which should be preserved rather than "conserved." If one adheres to a program of wise vegetation management, how can he conscientiously concur in the establishment of vast camp grounds and swimming facilities on sites where the plant cover and/or topographic features must be seriously disturbed or destroyed?

As an alternative to the grandiose schemes of NPS, I propose the setting aside of small blocks of valuable land (presently uninhabited) as natural areas, such as has been done so successfully by Wisconsin[7] and by the Nature Conservancy. For neo-recreationists, camping sites and perhaps artificial bodies of water could be created on marginal land of no great scientific worth, preferably closer to the cities. This procedure would release wilderness camp sites for those who know and appreciate what camping really is.

How far dare we extend the right of eminent domain? Is it really in the public interest to acquire vast acreages primarily for recreation at the expense of plant and animal life and private property? This whole subject bears investigation, not only for this one location but for the whole country (and even the world).

As a post-scriptum to this discussion, it has just been announced that during those final hectic days before Christmas (1963) the Senate passed a reduced version of S-792. The bill now encompasses some forty-seven thousand acres which include the valuable scientific areas but leave out most of the highly developed inland properties. This eli-

minates the threat to many private owners, but still offers no greater protection to the natural habitats. If the bill is enacted, the only way these sites can ever be saved is for the legislation to be rewritten with specific recommendations from ecologists—not necessarily (and preferably not!) those on the NPS staff who can see land only in terms of its "recreationability."

Sincerely yours,
VIRGINIA WEADOCK

FOOTNOTES

1 "Conversations on Ecology IV." *Garden Journal,* **13**(4): 141-142, 1963.

2 "Hearings before the Subcommittee on Public Lands of the Committee on Interior and Insular Affairs, U. S. Senate, on S-792 (Sleeping Bear Dunes National Lakeshore)," Washington, 1963, ix + 435 pp. (See p. 135.)

3 *IUCN Bulletin* (International Union for Conservation of Nature and Natural Resources), New Series, No. 1, August 1961, p. 2.

4 "Roughing it—a Lost Art," as reported by Ovid A. Martin, *Chicago Tribune,* September 1, 1963.

5 "Conversations on Ecology VI." *Garden Journal,* **13**(6): 219-220, 224, 1963.

6 "Sleeping Bear National Seashore—a proposal." U. S. Department of the Interior, National Park Service, 26 pp., 1961. (This brochure gives a good picture of the natural history features, if one can ignore the overshadowing recreational aspect of the presentation.)

7 Hugh H. Iltis: "Conservation of Natural Areas for Basic Scientific Research." Proc. North Central Branch, Entomol. Soc. Amer., **15**: 7-12. 1960.

CONVERSATIONS ON ECOLOGY IX

Dr. F. Raymond Fosberg is the head of the Pacific Vegetation Project, United States Geological Survey, Washington, D. C. He has made many contributions to plant taxonomy and nomenclature and to the definition and study of vegetation in the Pacific. A participant in many international symposia, Dr. Fosberg has taken an active part in improving our knowledge of vegetation structures and dynamics.

Aboard Japan Air Lines plane
enroute from Tokyo to Djakarta
November 29, 1963

Dear Luna:

Time was when one could learn a good bit of ecology—or plant geography—on almost any plane ride when the weather was decent. Significant patterns emerge, of which one gets no hint on the ground, when the landscape is seen from the air. However, when cruising in a big jet plane at thirty-four thousand feet, the air must be like crystal for one to see much of anything, and it seldom is so clear, especially in the humid tropics. A wing in the way does not help either. But what matters plant geography when one can fly ten miles a minute? We worship different gods now.

I am addressing this to you, Luna, because so far in these conversations you have made what seems to be the most important observation, or rather, asked the most serious question. We are talking about vegetation management (though I was not sure for a while) which seems to be an aspect of applied ecology. In this, as well as in other phases of applied ecology, perhaps the ultimate question is the one you asked: "What kind of land do we want to live in?" I tried to ask this same question in a less direct, but perhaps equally blunt, way in the Bangkok Symposium six years ago.[1] I predict it will be asked more and more often as time goes on and the results of what we are doing become apparent. Perhaps a side effect, or extra dividend, from *Silent Spring* will be that many more worried people may begin asking your question, which is far broader than the matter of pesticides or of vegetation management.

However, Pierre suggested that I write about vegetation management in the Pacific Islands. First, though, I want to take issue with Frank and his "ecosystemology." I have suggested several times that the study of ecosystems has at last become the proper preoccupation of ecologists,[2] and that ecology might now best be defined as the study of ecosystems. Frank objects because this is different from what he was taught as ecology thirty years ago, and from what some ecologists are still doing and thinking. I wonder if he would insist that the terms "chemistry" and "physics" be restricted to what we were taught thirty to forty years ago? When I had the temerity to suggest, thirty-seven years ago, that man might some day synthesize elements beyond uranium in the periodic system, I was told by my indignant chemistry instructor that this was a serious course, not science fiction. Now I see reviewed a book by Glenn Seaborg on the Trans-Uranium Elements. But we still speak of chemistry and physics. One of the plagues of ecology has been this tendency to invent new words, and bigger ones, rather than refining and improving the definitions of the ones we have. I don't object to coining new words to express new ideas, but they are a burden when they represent only attempted clarification of the meaning of old, well-established words. I suggest that ecology will become more and more the study of ecosystems. I may add that Frank Egler has had a great share in bringing this about.

Now, back to vegetation management in the Pacific Islands. Actually, as one looks at an assortment of Pacific islands, ranging from tiny rocks and bits of coral to the sub-continental Borneo and New Guinea, he is usually not much impressed with the *management* of vegetation, but rather with man's widespread *interference* with it. In many of the flatter, more favorable places, the natural vegetation has been replaced by cultivated, or at least planted, vegetation. Considerable areas are occupied by sugar cane, rice, taro, sweet potatoes, manihot, coconuts, breadfruit, pineapples, bananas, rubber, and various lesser crop plants. I take it that the management of these is not the subject under discussion, though it is certainly vegetation management. What of shifting agriculture, the widespread slash-and-burn subsistence-cropping of the tropics? Is this vegetation management? Or is it just periodic interference? Is the seasonal burning which is widely practiced in savanna and monsoon regions to be called management? In some places,

but not much in the Pacific Islands, burning is done to make the grass more palatable to stock. Maybe this is management. But in many islands the burning seems to be for fun, or to make walking easier—scarcely to be dignified by the term management. In some tropical areas, especially Malaya, forestry seems to be largely a matter of managing the native vegetation, but in few of the islands is anything so enlightened thought of. Forestry there consists of cutting down trees, or planting areas of exotic *Eucalyptus, Fraxinus,* or *Pinus,* or of indiscriminately introducing anything which will grow large enough to furnish fire-wood. In Hawaii there is what passes for pasture management—introduction of exotic grasses, overgrazing, and attempted removal of the resulting weeds by chemical spraying, or just letting them grow and clearing more land.

Most vegetation in the Pacific Islands, outside of certain areas on very large islands such as New Guinea and Borneo, and a few high-altitude areas on others, is no longer "original" or "natural" but simply shows the effect of widespread and drastic interference or disturbance. It has been subjected to the ravages of large herbivorous animals, against which it had evolved no defenses. This opened the way for introduced weeds—aggressive plants of all statures from the depressed *Dentella* to great mango trees. These have completely changed the character of the vegetation in many places. Over vast areas, brush of guava, *Leucaena, Lantana, Schinus, Eupatorium, Pennisetum, Prosopis, Clidemia, Opuntia,* and other undesirable aliens has replaced the native vegetation. The vegetation has been so degraded and changed that what it was originally like on many islands is now uncertain. But I would call little of this management.

Interestingly, only in one place has there been anything said about vegetation management by the native people. Marston Bates has told me that his impression on Ifaluk Atoll, in the Caroline Islands, was that every plant was where it was because it was permitted to grow there. In his book[3] he elaborated on this theme. Closer examination of many other atolls shows that such is the case here and there, especially in the more populated atolls. Of course, this is largely a matter of agriculture—mostly coconut planting.

Although the coconut plantations or groves are commonly regarded as the typical vegetation of the Pacific Islands, and certainly the coconut palm has been there a long time, it has probably always been associated with man. Only since the coming of Europeans, with their desire for copra for oil-making, have the coconut groves occupied the greater part of the landscape.

And what of the "good old days?" We really don't know how much effect the aborigines had on the vegetation, or how much of their effect was deliberate. The old accounts usually paint an attractive picture. In many islands, probably, the vegetation may have been more than man could deal with very effectively with wood, shell, and stone tools. Furthermore, the level land was along the shore, and the sea furnished abundant food. Bananas, coconuts, breadfruit, and candlenut were introduced and, with a little help, established themselves in certain niches as a part of the "natural" vegetation. Taro cultivation completely altered small areas of marsh, or areas which could be easily converted to marsh. On certain drier islands—Guam, Mangareva, and perhaps western Viti Levu and Guadalcanal—a tall, coarse, reedlike grass, *Miscanthus floridulus,* has replaced the forest after burning. Some of this might be termed management, but most was just interference, some of it mischievous interference. After Europeans arrived, the interference and resulting change accelerated rapidly. With modern tools and motivations, the acceleration became geometrical. Now almost nothing remains of the original plant cover, though probably most of the species still remain in very reduced numbers.

If any of what was here is to be preserved, maybe we had better start some management, in the best sense. Management for such ends is, of course, impossible on the basis of only what we know now. We have a suspicion that, left to themselves, certain native vegetation types, not too seriously damaged, may recover something of their original character. I have seen signs of this in several places in the Hawaiian Islands, even where the destruction had been very serious. Frank Egler[4] has made some suggestions as to how such recovery may be encouraged, but so far as I know they have been ignored. His beginning studies, made in 1937, should be continued and expanded. The roles of the important exotic species should be determined, also the place of the indigenous species in vegetational development.[5] Once we learn some of these things we may be in a better position to manage the vegetation, at least to the extent of allowing something like the original patterns and communities to reestablish themselves—though we may never have the means of knowing whether we have succeeded.

Meanwhile, since ecological study is a long-term undertaking, we had better get busy and try to preserve and protect as many areas of "natural" vegetation in the Pacific Islands as we can. Otherwise, the ecological study may fail for lack of subject matter, or may be rather futile from the viewpoint of restoring native vegetation. If the plants that made up the original vegetation of the islands are allowed to disappear or to become so biotype-impoverished that they cannot fulfill their ancient roles, all the vegetation-management in the world will not bring back anything like that original vegetation.

Sincerely,

F. R. Fosberg

Footnotes

1 F. R. Fosberg. Protection of Man's Environment, in, Fosberg, F. R. (ed.), "Climate, Vegetation and Rational Land Utilization in the Humid Tropics." Proc. 9th Pac. Sci. Cong. **20**: 159-161. 1958.

2 F. R. Fosberg 1963. The Ecosystem Concept, in, Fosberg, F. R. (ed.), "Man's place in the Island Ecosystem." Proc. 19th Pac. Sci. Cong., 1-6: publ. by Bishop Museum Press, Honolulu, 1963.

3 M. Bates and D. P. Abbott. *Coral Island.* New York, 1-254. 1958.

4 F. E. Egler. "Arid Southeast Oahu Vegetation." *Ecological Monographs* **17**: 383-435. 1947.

5 F. E. Egler. "Indigenous versus Alien in the Development of Hawaiian Vegetation." *Ecology* **23**: 14-23. 1942.

The naked earth is warm with spring,
And with green grass and bursting trees
Leans to the sun's gaze glorying,
And quivers in the sunny breeze;
And life is color and warmth and light
And a striving ever more for these.

Julian Grenfell

MY FRIENDS, THE WILDLINGS OF THE NEW YORK BOTANICAL GARDEN

By ARTHUR W. AMBLER

Mr. Ambler, a member of The New York Botanical Garden, also of The New York Zoological Society and of the National Audubon Society, spends his leisure in photographing nature subjects. All the photographs illustrating this series of articles were taken at the Garden.

continued from the January-February, 1964, issue.

PART III — EARLY SPRING

Fled now the sullen
murmurs of the North,
The splendid raiment of the
Spring peeps forth. —BLOOMFIELD

THE WARMTH of the sun and soft breezes awaken plants and animals from their winter dormancy and they commence a new cycle of life. There is a presentiment of lovely days to come, of flowers with myriad colors to decorate the landscape, and of melodies of birds to fill the air.

During March last year, as I strolled through the woodlands of The New York Botanical Garden, I found patches of snow here and there, where the warming sun had not penetrated the fullness of the evergreens, and I noted the arrival of purple grackles, and robins, and that the mourning-cloak butterfly *(Nymphalis antiopa)* had come out of hibernation. In a marshy area I saw the closely coiled spathe of the skunk cabbage *(Symplocarpus foetidus),* streaked and blotched with purplish red, rising above the black earth and debris of last year's growth. The spathe, which is not without aesthetic interest, provides shelter for early insects. I searched along the east bank of the Bronx River near the Snuff Mill for coltsfoot *(Tussilago farfara)* for I have seen this plant very early in March, sending up its scaly leafless scape at the top of which is a single, brilliant yellow flower.

Skunk cabbage, *Symplocarpus foetidus.*

Again the blackbirds sing; the streams
Wake, laughing, from their winter dreams,
And tremble in the April showers
The tassels of the maple flowers. —Whittier

With the coming of April spring really begins her display. A happy atmosphere is prevalent around the Garden as it dons its cloak of green, welcomes its avian friends arriving from the South and bids adieu to the slate-colored junco *(Junco hyemalis),* eastern tree sparrow *(Spizella arborea),* golden-crowned kinglet *(Regulus satropa),* and the eastern fox sparrow *(Passerella iliaca),* leaving for their breeding grounds in the North.

It is the hope of every nature observer, as I have previously said, to come upon the unexpected. It does not happen too often, but did happen for me not once but twice on an April morning along the banks of the Bronx River. My eyes were glancing over the ground for early spring flowers when a splash in the river attracted my attention. It was a male wood duck *(Aix sponza).* The male in its winter dress is the most highly colored North American duck, a very beautiful creature, indeed. I considered the photographs of the wood duck sufficient accomplishment for one day and was ready to leave the Garden. But another surprise awaited. Some fifty feet south of the Stone Bridge I saw what appeared to be a peculiar formation of logs floating in the middle of the river. Looking through the finder of my camera, which was mounted on a long telephoto lens, I saw two snapper turtles *(Chelydra serpentina)* resting on the logs. This species is large, eighteen or more inches long, and weighs up to forty pounds. Because of its long neck, powerful jaw, and vicious temper, the snapper turtle is a dangerous reptile. It is aquatic and prefers quiet muddy water, so parts of the Bronx River are

Male wood duck, *Aix sponza.*

Marsh-marigold, *Caltha palustris.*

Yellow adder's tongue, *Erythronium americanum.*

suitable for its habitation. Its food is fish and sometimes water-fowl—mallard ducklings are a comfortable mouthful for a snapper turtle.

In late March and early April, most of the trees and shrubs are just beginning to leaf out. The density of foliage is not sufficient to screen out sunlight, and therefore it is in wooded areas that I look for many of the early spring wild flowers. Some of them prefer moist ground, others dry. I search for specific plants in their particular habitats. Weather conditions may retard or advance their appearance. However, the time of blooming is approximately the same each year; seldom have I found it to vary more than a week or so in The New York Botanical Garden.

Along the edge of the woodlands bordering the Bronx River, and in other wooded places where the soil is moist, I have located attractive patches of a small, golden-yellow, lily-like flower, rising five to ten inches above ground, with two elliptical, strongly mottled green leaves. This is the yellow adder's tongue *(Erythronium americanum),* sometimes called trout-lily.

Snapper turtle, *Chelydera serpentina,* and young resting on log in Bronx River near the Stone Bridge in The New York Botanical Garden.

Spring beauty, *Claytonia virginica.*

In similar locations I have observed spring-beauty *(Claytonia virginica),* an exquisite little flower growing in clumps of one hundred or more. The flower is not quite white, but has a delicate pinkish tinge and is distinguished by veins of deep pink on the petals. The leaves are linear, grasslike in appearance.

In a marshy spot along the banks of the Bronx River I photographed the marsh-marigold *(Caltha palustris),* a brilliant harbinger of spring. This stocky plant with kidney-shaped leaves and golden-yellow flowers favors wet meadows or swamplands.

Veering away from the river on this early April day, I followed a trail which crosses a small meadow and leads into the dry woodlands. Near a large boulder, cool and moist, I found a sizeable stand of bluets *(Houstonia caerulea),* also called Quaker-ladies. This tiny wild flower grows in profusion in moist grassy places, covering good-sized areas with its dainty white and pale blue blooms which have a yellow eye.

Farther along I came upon the sweet white violet *(Viola blanda)* and lance-leaved violet *(V. lanceolata).*

Late last March I visited the spot in the woods where in

Hepatica, or liverwort, *Hepatica nobilis.*

Blood-root, *Sanguinaria canadensis.*

Bluets or
Quaker-ladies,
Houstonia caerulea.

previous years I had seen a few plants of hepatica or liverwort *(H. nobilis,)* but there was no sign of growth. I hoped the plants had not been winter-killed. This earliest of spring flowers sometimes appears when snow is still on the ground. In April I returned to this same spot and there, to my great pleasure, I found the plants, about three inches high, half hidden by the leaves fallen from nearby trees.

The woods were still bare and brown, the floor covered with decaying leaves, but on the wood's margin bloomed a solitary blood-root *(Sanguinaria canadensis)*. I like to find this plant with its beautiful pure white flower early in the day, when the petals are open flat; they become erect in the afternoon and close by evening.

While resting and making notes for future reference, I saw high above me, against the clear blue sky, a flock of large, white birds with black wing-tips. They were making a tremendous noise. These herring gulls *(Larus argentatus smithsonianus)* to twenty-six inches, sometimes called "sea-gulls," are common along the Atlantic Coast and some distance inland. In cities their greatest number is usually found wherever there is refuse or garbage dumps. They will eat almost anything—insects, crustaceans, molluscs, small fish, berries, and garbage. Surviving under conditions which destroy many other birds, they enjoy a long life span. It has been reported that captive gulls have lived as long as forty years.

I succeeded in photographing the gull, illustrated in these pages, when it separated from its companions and flew lower to investigate the Bronx River.

To be continued

Herring gull, *Larus argentatus;* sometimes called "sea gull."

THE NEW YORK BOTANICAL GARDEN

Annual Meeting of the Corporation

May 4, 1964

All members of The New York Botanical Garden are cordially invited to attend the Annual Meeting of the Corporation at the Lorillard Snuff Mill at the Garden on Monday, May 4, 1964, at 2:30 p.m.

At this meeting, members of the Corporation, which is the parent body of the Garden, will elect members of the Board of Managers and will receive various reports on the Garden's activities. Distinguished Service Awards will also be presented at the meeting.

Formal notice of the meeting will be sent to all members of the Corporation, whose names appear below.

Arthur M. Anderson
W. Earle Andrews
Mrs. Montgomery B. Angell
Mrs. Harold E. Anthony
George Arents, Jr.
Mrs. Elliott Averett
Sherman Baldwin
Mrs. John Holme Ballantine
Mrs. William Felton Barrett
Mrs. John D. Beals, Jr.
Mrs. Franklin B. Benkard
Mrs. Neville J. Booker
Mrs. James Cox Brady
Mrs. Richard De W. Brixey
Mrs. Detlev W. Bronk
Dr. Lyndon O. Brown
Leonard J. Buck
Charles Burlingham
Mrs. Charles Burlingham
Mrs. F. Higginson Cabot
Mrs. Joseph Campbell
Mrs. LeRoy Clark
Dr. Harold H. Clum
Mrs. Leighton H. Coleman
Mrs. Henry S. Fenimore Cooper
Mrs. Erastus Corning II
Mrs. William Redmond Cross
C. Suydam Cutting
Mrs. Sidney G. de Kay
Edward C. Delafield
Mrs. Edward C. Delafield
Mrs. Lyman Delano
Hon. Thomas C. Desmond
Mrs. Fairman R. Dick
Mrs. Charles D. Dickey
Mrs. Charles Doscher
Mrs. Percy L. Douglas
Henry F. du Pont
Mrs. Walter K. Earle
Mrs. William B. Eddison
Mrs. Robert B. English
Harold Epstein
Mrs. Marcus Fair
Mrs. B. Tappen Fairchild
Mrs. Reginald Fincke
Dr. John M. Fogg, Jr.
Mrs. Mortimer J. Fox
Mrs. Edward W. Freeman
Childs Frick
Mrs. John W. Galbreath
Mrs. John Gerdes
Dr. H. A. Gleason
Mrs. L. Whittington Gorham
Mrs. Raymond M. Gunnison
Mrs. Henry B. Guthrie
Mrs. Sherman P. Haight
Charles B. Harding
Mrs. Randolph C. Harrison
William E. Hutton
Mrs. J. Horton Ijams
Mrs. Edwin C. Jameson
Mrs. Alvin R. Jennings
Rodney Wilcox Jones
Prof. Marshall Kay
Dr. Theodore Kazimiroff
Mrs. William Kemble
Mrs. Francis K. Kernan
Dr. Charles G. King
Mrs. Warren Kinney
Mrs. Grayson Kirk
Mrs. Blake L. Lawrence
Mrs. Barent Lefferts
Mrs. Madison H. Lewis
Mrs. John E. Lockwood
Judge Charles A. Loreto
Mrs. Robert A. Lovett
Mrs. Ethelbert Ide Low
Mrs. Donald Lowe
Mrs. James C. Mackenzie
Mrs. Peter Malevsky-Malevitch
Mrs. Clifford D. Mallory
Alastair Martin
Prof. Edwin B. Matzke
Louis E. McFadden
Mrs. Richard S. Meredith
Miss Elinor Merrell
Mrs. Elmer D. Merrill
Mrs. Clarence G. Michalis
S. P. Miller
Mrs. Harold Ruckman Mixsell
Henry de la Montagne
Mrs. Roger G. Mook
Barrington Moore
B. Y. Morrison
Frederick S. Moseley, Jr.
Mrs. Augustus G. Paine
Henry Parish II
Mrs. John E. Parsons
Mrs. Wheeler H. Peckham
Mrs. Harry T. Peters
Mrs. Thomas McC. Peters
Howard Phipps
Mrs. H. Harvey Pike
Mrs. Hermann G. Place
Rutherford Platt
Prof. Frank J. Pokorny
Mrs. Harold I. Pratt
Mrs. Charles G. Proffitt
Lady Ramsey
Mrs. S. Bulkley Randolph
Johnston L. Redmond
Mrs. Fergus Reid, Jr.
Mrs. Volney F. Righter
Mrs. David C. Rockefeller
Mrs. George Emlen Roosevelt
Mrs. Herman D. Ruhm, Jr.
Mrs. Melvin E. Sawin
John M. Schiff
Mrs. Henry F. Schwarz
Mrs. Townsend Scudder
Mrs. John L. Senior
Dale E. Sharp
Mrs. Guthrie Shaw
Langdon S. Simons
Mrs. Langdon S. Simons
Mrs. John C. Sluder
Mrs. Clarance Stanley
Dr. William C. Steere
Mrs. Eugene W. Stetson
Chauncey Stillman
Mrs. Byron Stookey
Mrs. Donald B. Straus
Mrs. Paul Sturtevant
Mrs. Arthur H. Sulzberger
Mrs. Cochran B. Supplee
Joseph R. Swan
Mrs. Joseph R. Swan
Mrs. Thomas D. Thacher
Oakleigh L. Thorne
John C. Traphagen
Mrs. Ernest G. Vietor
Mrs. Oliver A. Vietor
R. Gordon Wasson
Mrs. Thomas J. Watson
Mrs. Charles D. Webster
Mrs. Jerome P. Webster
Mrs. Arnold Whitridge
Mrs. Wallace S. Whittaker
Mrs. Earl K. Williams
Mrs. John G. Winchester
Dr. John C. Wister

Arthur F. Murphy is giving instruction to two students in the Two-Year Course in Landscape Gardening at The New York Botanical Garden. Mr. Murphy is Senior Landscape Architect of the New York City Park Department, in charge of Planting Design.

Robert Russo, Foreman in charge of the Propagating Greenhouses, has the close attention of a class in house plants.

The high ranger aerial tower is used chiefly for pruning. Here one of the gardeners rides the "bucket," as he prunes the upper branches of a tall tree.

NEWS, NOTES and COMMENTS

Plant Science Series. Several years ago, Dr. Richard M. Klein, Alfred H. Caspary Curator of Plant Physiology, conceived the idea of a series of books especially designed to acquaint the scientifically-minded high school student, non-science college students, teachers, home gardeners, and the naturalist public with modern plant science. The interest of the general public in plants and the success of the Two-year Course in Botany at The New York Botanical Garden indicated that the Garden's program of education on botanical subjects could be advantageously expanded by the publication of a series of inexpensive books.

With the assistance of Dr. David J. Rogers, Curator of Quantitative Taxonomy, and Dr. William C. Steere, Director, James K. Page, Jr., the Editor, and Richard K. Winslow, the Publisher of the Natural History Press division of Doubleday and Company, were informed of the project—and as a result, an agreement was effected between the Garden and Doubleday to publish The New York Botanical Garden Plant Science Series. The Garden will have the responsibility of selecting the topics and the authors for the books in the Series and will also appoint editors for each volume. These responsibilities are invested in a committee on which Dr. Arthur Cronquist, Dr. Richard M. Klein, Dr. David J. Rogers, Dr. Clark Rogerson, and Dr. William C. Steere are serving with Dr. Pierre Dansereau as chairman.

Each paperbound volume in the Series will contain about one hundred and fifty pages, will be illustrated with photographs and line drawings, and will be indexed for easy reference. The text, although authoritative and accurate, will be completely understandable to a non-scientist. A modern cover, designed by the Natural History Press, has been approved. The official symbol of The New York Botanical Garden, the leaf of the tulip-tree, will be used as the colophon for the entire series.

All phases of botanical science will be treated by recognized authorities who will usually be professional botanists. The Series is viewed as a continuing project for the next five years. It is hoped that twenty to twenty-five volumes will be published in this period of time. The first volumes are scheduled to appear in the spring of 1965. Several members of the professional staff of the Garden are now preparing volumes for the Series. These include Dr. Howard Irwin, Dr. Herman Becker, and Dr. David Rogers. Scientists from other institutions are also writing books for the Series. Dr. Klein and Dr. Rogers are co-editing some of the books and other staff members are also serving as editors.

Dr. Steere, when asked about The New York Botanical Garden Plant Science Series, commented, "According to a cornerstone of the Museum Building, the purpose of The New York Botanical Garden is 'for the advancement of botanical knowledge.' The dissemination of botanical knowledge through a series of authoritative books designed for the intelligent lay public is, in my opinion, a highly appropriate means of carrying out this mission. These books add one more proof of the high stature of The New York Botanical Garden as an institution dedicated to botanical research and teaching."

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Two New Courses at the Garden. A course in Wild Flower Gardening will be offered for the first time at The New York Botanical Garden this spring. Dr. Lucille Blum of the Department of Botany, Columbia University, will conduct the course six Wednesday mornings, beginning April 22.

Children will be introduced to the wonders of nature, both plant and animal life, in another new course, Garden Nature Study. Open to young people between the ages of ten and fourteen, the course will be taught by the talented naturalist, Mrs. Eleanor Yarrow.

Activities of the Director and Staff. Dr. William C. Steere, Director, attended the meetings of the American Association for the Advancement of Science in Cleveland, Ohio, December 26-30, 1963. Dr. Steere will give the principal address at the banquet of the eighteenth annual Williamsburg Garden Symposium in Colonial Williamsburg on March 18. His subject will be "Arctic Relatives of our Garden Flowers."

Dr. Clark T. Rogerson, Curator of Cryptogamic Botany, attended the meetings of the American Association for the Advancement of Science in Cleveland as a Council Delegate for the Mycological Society of America and the Torrey Botanical Club.

Dr. Michael Levin joined the Department of Quantitative Taxonomy under Dr. David J. Rogers, Curator, to assist in the continuation of computer studies of marine algae. He will devote sixty per cent of his time to research and forty per cent to the Cryptogamic Herbarium, assisting Dr. Rogerson with the Garden's algal collections. Dr. Levin's assignment is under a grant to Dr. Rogers from the Office of Naval Research.

Dr. Alma Barksdale, Senior Research Associate, will present a seminar entitled "Sexual Conjugation in Achlya" on March 12, 1964, for the Biology Department of the University of Connecticut at Storrs.

Dr. Marjorie Anchel, Senior Research Associate, addressed a graduate seminar of the Chemistry Department of Queens College on "Naturally Occurring Polyacetylenes" in December, 1963.

In the same month, Dr. Trevor McMorris, Research Associate, spoke to a graduate seminar of the Chemistry Department of Princeton University on "The Structure of the Illudins and other Basidiomycete Products."

Robert Breach has joined the staff of The New York Botanical Garden as Curator of Publications. The former president of Gordon and Breach Science Publishers, Inc., he also served as executive vice president of Consultant's Bureau Enterprises, which publishes scientific and technical books and journals.

Gordon Wasson, Honorary Research Associate, has been traveling in the Orient in recent months. Rokyua Imazeki of the Laboratory of Forest Mycology, Division of Forest Protection of the Ministry of Agriculture and Forestry, Tokyo, accompanied Mr. Wasson to Kyoto and other places for ten days the latter part of 1963. Mr. Wasson, who was interested in collecting ethnomycological data, lectured on Mexican hallucinogenic mushrooms on several occasions, creating a deep impression on mycologists, chemists, physicians, ethnologists and others. He re-

turned to Tokyo in February after a trip to India.

Dr. Rickett Honored. At the annual meeting of The Horticultural Society of New York, held on January 15, 1964, Dr. Harold William Rickett received a distinguished service award, as a professional, for outstanding service to horticulture. The citation accompanying the award follows:

English by birth, American by adoption, an eminent scholar, botanist, bibliographer, teacher, author, and lecturer.

He received his Doctor's, Master's and Bachelor of Art degrees from the University of Wisconsin, though his first two years of college were at Harvard University. From the Botany faculty of the University of Missouri he moved to The New York Botanical Garden as assistant bibliographer, advancing to bibliographer in 1942, three years later. In 1959, he assumed the additional responsibilities of Acting Assistant Director (Botany).

Dr. Rickett, a delegate to the Seventh, Eighth, and Ninth International Botanical Congresses, has been deeply concerned in international botanical nomenclature, a member of the editorial board of the International Code for Botanical Nomenclature, and Secretary of the Committee for Spermatophyte (flowering plants) since 1956. For this work, he was awarded a grant from the National Science Foundation in 1958, and a four-year grant in 1960.

Author of many scientific papers, editor of several botanical periodicals, he is co-author with William J. Robbins of *Botany*, a college textbook, published in three editions.

Presently, Dr. Rickett holds the title of Senior Botanist of The New York Botanical Garden and is preparing the first of a five-volume series on the wild flowers of the United States, to be published by the Garden with the generous support of Mrs. David Rockefeller and her committee. This past summer he drove sixteen thousand miles through midwestern and western states, enlisting collaborators, inspecting large collections of colored transparencies and photographs, and photographing about four hundred species of wild flowers in such places as Mt. Baldy in the White Mountains of Arizona, Sycamore Canon in Arizona, and in the alpine garden on Mt. Rainier. This is indicative of the enormous amount of travel and work entailed in preparing and editing these volumes which will be of great importance to nature lovers and gardeners.

Amateur gardeners are familiar with his earlier books:—*The Green Earth,* which has been described as "poetic prose"; *Botany for Gardeners;* and most recently, *The New Field Book of American Wild Flowers.*

His teaching at The New York Botanical Garden, (in alternate years since 1942) has helped many amateur gardeners, including some Horticultural Society of New York members. He excels in lucid explanation of the life cycle of plants—their intricate parts and functions—toward a better understanding of plants, enabling an amateur to grow them with more intelligence and pleasure.

The Horticultural Society of New York honors Dr. Harold William Rickett for his many contributions to botany and especially for his inspired interpretations of botany for gardeners and presents to him its distinguished service award.

MRS. HERMANN G. PLACE
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DR. ALBERT J. IRVING, *Chairman*

Frederick Paddock Lee, prominent lawyer of Washington, D. C., was honored, as an amateur, for his contribution to horticulture, especially for his writings on azaleas; and the Department of Floriculture and Ornamental Horticulture, Cornell University, as an institution, for valuable horticultural contributions by the Horticultural Society of New York.

Retirement and Anniversary Gifts were distributed to employees of The New York Botanical Garden by Dr. William C. Steere, Director, at the annual Christmas party. Retirement gifts were presented to Michael Griffin, greenhouse foreman; John and Percy Diver, Mendel Kneller, Edward Maroney, and Max Nastold, gardeners; Henry Leider, custodian; Charles Zottola, attendant; Andrew Ross, painter; and E. J. Countey, chief accountant. An anniversary and retirement gift was given to Edward Whitford, park foreman, who had been an employee for the past forty years. Anniversary gifts were presented to John Borin, greenhouse foreman employed at the Garden forty years; Earle Dugan, stock man, employed here for thirty-five years; and Edward Maguire, attendant, for twenty-five years.

Staff Seminars. Dr. Mario Ricardi, while visiting The New York Botanical Garden in mid-December, 1963, gave an illustrated lecture on "Synopsis of Chilean Flora" before a staff seminar. Dr. Ricardi is Professor of Botany and Director of Horticulture, Universidad de Concepcion, Chile. Lincoln Adderley, gardener at the Garden, presented an illustrated lecture on "Orchid Species of Venezuela" before the staff in January, and Walter Singer, Staff Photographer, advised the staff on "Garden Photography" in February.

Visitors to the Garden

Dr. Elizabeth Verder, National Science Foundation, Washington, D. C.

Dr. Walter J. Nickerson, Institute of Microbiology, Rutgers The State University, New Brunswick, N. J.

Dr. Paul Bauer, Seton Hall College of Medicine, East Orange, N. J.

Dr. Lyman B. Smith, and Dr. John J. Wurdack, Smithsonian Institution, Washington, D. C.

Dr. Mario Ricardi, Universidad de Concepcion, Chile.

Dr. R. E. Perdue and Dr. Quentin Jones, U. S. Department of Agriculture, Beltsville, Md.

Dr. R. J. Moore, Plant Research Institute, Dept. of Agriculture, Ottawa, Canada.

Dr. Tang-shui Liu, Dept. of Forestry, College of Agriculture, National Taiwan University, Taipei, Taiwan, Republic of China.

Dr. Shiu-ying Hu, Arnold Arboretum, Cambridge, Mass.

Melvin L. Bristol, Botanical Museum, Cambridge, Mass.

Aaron Goldberg, Washington, D. C.

James Fiore, Dept. of Botany, Duke University, Durham, N. C.

Dr. Elmer George Worthley, Natural Products Laboratory, CRDL, Edgewood Arsenal, Md.

Harry E. Ahles, Dept. of Botany, University of North Carolina, Chapel Hill, N. C.

Dr. William Randolph Taylor, Chester W. Laskowski, and Ronald L. Strickey, Dept. of Botany, University of Michigan, Ann Arbor, Mich.

C. Bas, Ryksherbarium, Leiden, The Netherlands.

Dr. Clement G. Bowers, Maine, N. Y. at one time a member of the Garden's staff, visited the Garden in December, 1963. Dr. Bowers, now retired, is a Research Associate of Cornell University and a member of the Cornell Plantations Committee. He was recipient of the gold medal of the American Rhododendron Society in 1963, the Jackson Dawson Medal of the

Dr. William C. Steere, Director, congratulates Edward Whitford upon his retirement after forty years of service at the Garden. Others in the group are, left to right, Edward Maguire, Percy Diver, Edward Maroney, Andrew Ross, Mendell Kneller, and George Friedhof. Mr. Friedhof retired two years ago.

Massachusetts Horticultural Society in 1962, and the gold medal of the Men's Garden Clubs of America several years ago.

Dr. Mildred Mathias (Mrs. Gerald Hasler) received the 1963 "Woman of Science" award from the University of California, Los Angeles, Medical Center Auxiliary. Dr. Mathias who studied at the Garden thirty years ago, is now head of the Department of Botany at UCLA, Chairman of the Council of the American Society of Plant Taxonomists, on the Advisory Committee of Hunt Botanical Library, and engaged in many other activities. She has also raised a family and carried on extensive researches and explorations (recently in Africa for drug plants).

Truman George Yuncker, 1891-1964. Truman Yuncker for many years had been closely associated with researches being carried out or published at The New York Botanical Garden. We therefore knew him intimately as an amiable and generous friend as well as a competent and respected taxonomist.

Professor Yuncker has had a long and distinguished career as teacher, investigator, and field man. His numerous explorations have taken him to the Pacific Islands, and in the American tropics to the West Indies and Central America. Especially has he gained eminence in his systematic research in the genus *Cuscuta,* and the large and complex tropical family *Piperaceae,* for which seventy-seven titles are indexed in the Garden's library card catalogue.

During the past two decades Professor Yuncker has been a frequent contributor to the Garden's reports on its own Neotropical explorations. He will offer the *Piperaceae* in "The Botany of the Guayana Highland," Part V, scheduled to appear in *Memoirs of The New York Botanical Garden* in mid-February. His treatment of *Cuscuta* for the *North American Flora* is now in the hands of the editor at the Garden. And lastly, his monograph on the *Piperaceae* of Brazil, which will be one of his most impressive contributions, is now being edited by his wife and his close friend and colleague, Professor Winona Welch.

Professor Yuncker died in Greencastle on January 8, 1964, of a coronary thrombosis. There is no one now on the horizon who can replace his competence in the difficult taxonomy of the *Piperaceae.*

BASSETT MAGUIRE

A Wild Flower Garden will be established in Cornell Plantations as the result of a gift from Mrs. Floyd W. Mundy, Jr., of Scarsdale, N. Y., whose husband is a graduate of Cornell, class of 1928. Mrs. Mundy's gift has established the Cornell Plantation Wild Flower Fund. The first plantings will be of wild flowers found in the Ithaca area. As additional funds become available, plantings of other wild flowers native to New York State will be made.

The fifteen-hundred acres of Cornell Plantations serve as a laboratory for staff and students. It includes a natural area of undisturbed woods; managed areas demonstrating land use and woodlot management; collections of lilacs, peonies, rhododendrons, nut trees, flowering crabs, viburnums; and field plots for special research.

Torrey Botanical Club. One hundred and forty members and guests attended the annual dinner and meeting held on January 21, 1964. Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Research at The New York Botanical Garden, gave his presidential address, "Twenty Years of Exploration in the Neotropics."

At the meeting on February 18, Dr. Ruth Sager of Columbia University spoke on "Non-Chromosomal Genes in Chlamydomonas"; on March 3, Dr. Neal Weber of Swarthmore College discussed "The Fungus-Growing Ant Fungi."

On March 17, Dr. Robert Whittaker of Brooklyn College will present "The Sonoran Desert."

On April 7, Dr. Alma Barksdale will discuss "Sexual Conjugation in Achlya"; on April 21, Dr. Luigi Provasali, "Nutritional Requirements of Some Seaweeds"; on May 5, Dr. Bruce Voeller, "Antheridogens in Ferns"; and on May 19, Dr. Robert Owens, "Nematode Neoplasms of Plants."

These meetings are being held in Room 760, Schermerhorn Extension, Columbia University.

Crab-Apple Collection. One of the world's most complete collections of material on ornamental crab-apples has been given to the herbarium of the United States National Arboretum in Washington, D. C. The collection, assembled by the late Arie F. den Boer of Des Moines, Iowa, is a gift from his widow, Mrs. Gusta den Boer. The gift includes herbarium specimens, seeds, and valuable scientific notes.

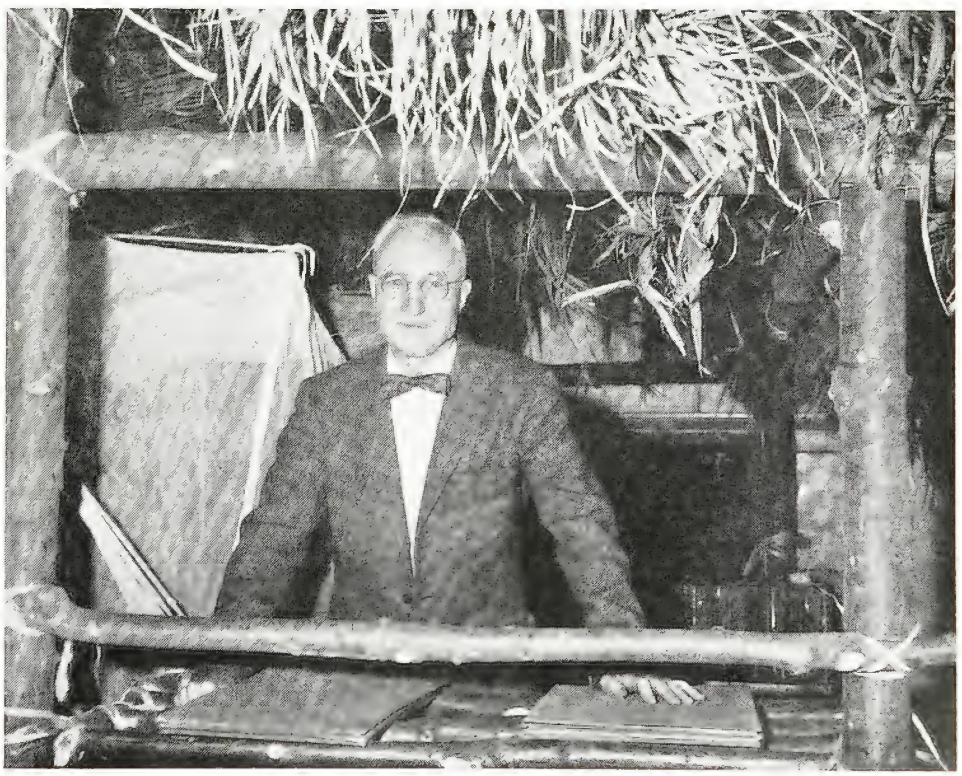
Dr. Frederick G. Meyer, in charge of the Arboretum's herbarium, says the collection is especially valuable because it contains authentically named specimens of significance to specialists on flowering crab-apples growing in the United States.

Mrs. den Boer's gift also includes a carbon copy of the original manuscript of Mr. den Boer's book, *Ornamental Crab-apples,* published by the American Association of Nurserymen in 1959.

Mr. den Boer made frequent gifts to the National Arboretum before he died in October, 1962; many of the crab-apples growing on the grounds are a result of his generosity. He came to this country from The Netherlands during World War I, and served for thirty years as superintendent of Water Works Park in Des Moines.

The Sterling Morton Library of the Morton Arboretum, at Lisle, Illinois, dedicated on October 22, 1963, is a gift from Preston Owsley Morton in memory of her husband. Sterling Morton, the only son of Jay Morton, the Arboretum's founder, was a trustee from the inception of the Arboretum in 1922 until his death in 1961.

The library forms the east wing to the group of buildings known as the Arboretum Center. Designed by Harry Weese, it is a single story and basement building continuing the stone combination of the earlier sections. The main floor is devoted to a spacious reading room attractively subdivided by an oval of free standing book-



Dr. Basset Maguire, Head Curator and Coordinator of Tropical Research, stands in the house of the Akawaio, a tribe of South American forest Indians of the Pakaraima Mountains of British Guiana, which has been adapted for expeditionary use. This is one of the features of the current exhibit on the Garden's program of exploration, arranged in the Museum and Administration Building by Mrs. Charles Burlingham, Honorary Curator of Museum Exhibits.

cases, creating the impression of a room within a room. The floor is of handmade hexagonal tile, the woodwork of cherry, the shelving of plate glass. Wide floor to ceiling windows look south and east over the Arboretum grounds.

The floor below the reading room, in addition to book stacks, staff workrooms, and study carrels, houses special areas for nursery catalogues and photographic collections.

The growing collection of rare books contains early writings on science, natural history, gardening, and husbandry; accounts of botanical travels; systematic botany, including first editions of Linnaeus; historic floras from many countries; and books treating of landscape architecture and garden design. Books noted for their illustration are especially well represented from the sixteenth century through the great flower books of the eighteenth and early nineteenth centuries.

The May T. Watts Reading Room is reached through a door in the east end of the reading room. This walled garden, named in honor of the Arboretum's distinguished Naturalist Emeritus who originated the idea for it, offers the reader the choice of a tree-shaded corner or a sunny pool-side seat. The designer of the Reading Room is Miss Watts' former pupil, Mary K. Moulton, a landscape architect and now Librarian of the Sterling Morton Library.

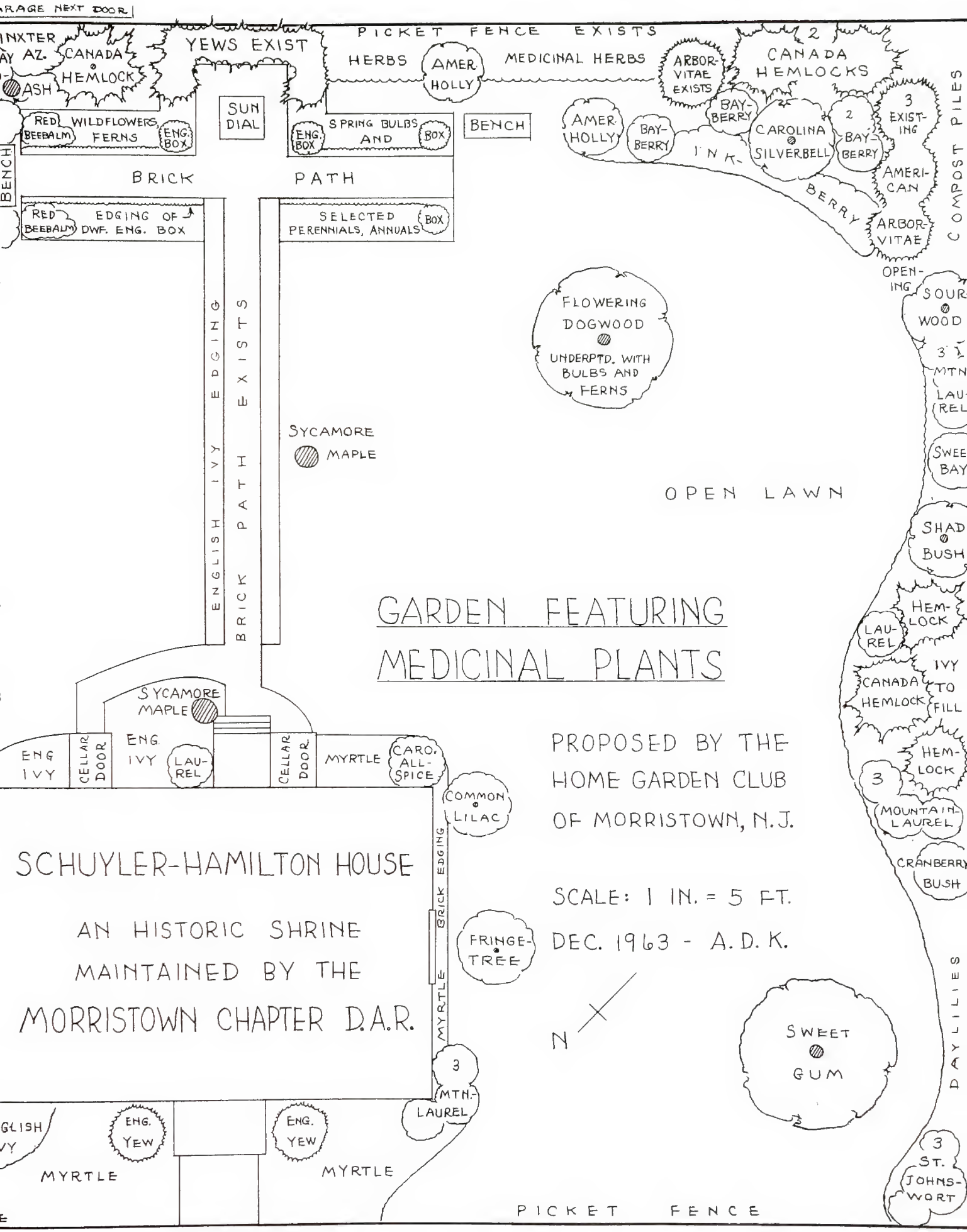
Eighteenth-Century Physic Garden. The Home Garden Club of Morristown, New Jersey, is planning an eighteenth-century physic garden for the historic Schuyler-Hamilton House on the actual site of a garden which belonged to Dr. Jabez Campfield. Dr. Campfield lived there and operated as a surgeon during the Revolutionary War. The house was moved from its original site to the property that includes the remains of the early physician's garden, by the Morristown Chapter of the Daughters of the American Revolution, owners and administrators of the house since 1923. It is now located on Olyphant Place in Morristown. Many visitors to the old Ford Mansion in Morristown National Historic Park make a point of stopping to see the home where Alexander Hamilton courted Elizabeth Schuyler in 1780.

Dr. Campfield kept a diary of the years he served General Washington, on a campaign with General John Sullivan against the Indians of Pennsylvania and New York during the Revolution. It is in the collection of the New Jersey Historical Society and reveals the doctor's knowledge of plants with which he treated the military and his patients from Morris County. It is especially fitting that the medicinal herb garden planned for the improvement of the historic property should thus honor the man who gave up the comfort of his home for the rigors of the wilds during the war.

(Continued on page 80)

A visitor is interested in the cultural information posted on the wall of the lath house in which the House Plant Show was staged in the Conservatory, during January and February, 1964. The insert shows the section on transplanting.

Young visitors enjoy the stepping stones and tea house in the Chrysanthemum Show in the Conservatory of The New York Botanical Garden, in November, 1963, the motif of which was Japanese.



GARDEN FEATURING MEDICINAL PLANTS

PROPOSED BY THE HOME GARDEN CLUB OF MORRISTOWN, N.J.

SCALE: 1 IN. = 5 FT.

DEC. 1963 - A. D. K.

N

SCHUYLER-HAMILTON HOUSE

AN HISTORIC SHRINE MAINTAINED BY THE MORRISTOWN CHAPTER D.A.R.

BOOK REVIEWS

GREAT GARDENS OF THE WESTERN WORLD. Coats, Peter, with an introduction by Harold Nicolson. 288 pages, illustrated (part colored). G. P. Putnam's Sons, New York, N. Y. 1963. $22.95.

Many handsome books on gardens have been published lately. Last year there was one on Italian gardens, and now comes this good-looking book on gardens of the western world. Some of the gardens are old, such as the Alhambra, La Gamberaia, Villandry, and Aranjuez; some are comparatively recent, such as the Magnolia, Middleton, and Cypress Gardens of South Carolina; and it is good to see Winterthur and the Savill gardens illustrated and described for they are modern. These gardens are, of course, too grand for the average person to emulate, but they can be an inspiration and add to his skill in planning.

It is a pleasure to see my friend J. C. N. Forestier given credit for the development of the truly poetic rose garden at Bagatelle in the Bois de Boulogne. And close by is the iris garden, though the perennial planting is not mentioned.

There are beautiful pictures of many gardens well worth visiting today—Vaux le Vicomte and Courances in France, Sissinghurst in Kent, Powerscourt in Ireland, the fine garden of Villa Taranto on Lago Maggiore right against the Alps, and the gardens of Williamsburg in Virginia.

HELEN M. FOX
Bedford, N. Y.

COFFEE RECIPES, CUSTOMS, FACTS AND FANCIES. Gordon, Jean. 97 pages. Red Rose Publications, St. Augustine, Fla. 1963. Paper $1.50, cloth $3.50.

Although the thrifty Victorian housewife—and I admit knowing some of the turn-of-the-century vintage—righteously used old coffee grounds for sweeping wall-to-wall carpeting and for stuffing pincushions, it is the bayou-country coffee of Louisiana which is truly glamorous: "as black as the devil, as hot as hell, as pure as an angel, and as sweet as love!" All that glamour as well as sound facts may be found in the latest book by Jean Gordon—this time about coffee, similar to those in the past about roses and oranges. She has followed the familiar broken rhythm pattern which is slightly disturbing to those accustomed to a neatly categorized cookbook—for gloss it as we will, this is a cookbook! One could wish for a more orderly marshaling of lists and lore, of history and recipes, but then, there is an excellent index from which one can pick and choose. And perhaps this style is akin to modern music, to contemporary art—the reader may group the details as he interprets their content.

To sample a few of the long list of designations for our King-of-the-American breakfast table—coffee has been called "the gift of Heaven to the human race by the Gods," "the drink of Democracy," "the wine which no sorrow can resist," "lovelier than a thousand kisses." Also maligned as poison, coffee could well be the subject of another investigation, aimed at the welfare of our citizens by a paternalistic Guardian of the People's Health.

More than one hundred kinds of coffee in the coffee markets are described as to character and flavor. There are histories of the introduction of coffee into Brazil by diplomatic guile: into Martinique by theft from the Jardin des Plantes in Paris in 1723—all after the legendary discovery of coffee in the twelfth century. From Mme. de Pompadour's gold coffee mill, carved to represent the branches of a coffee tree, and the expenditure of $15,000 annually by Louis XV for coffee, to the Arab host who grinds the freshly roasted beans for each guest and never fills the tiny cup completely, as a full cup means "this drink up and depart," the slim volume is a veritable storehouse of information. And as for a coffee substitute—the best economy is to go without!

ELIZABETH REMSEN VAN BRUNT
Kitchawan, New York

FLORA OF MISSOURI. Steyermark, Julian A. lxxiii + 1725 pp, illustrated, indexed. Iowa State University Press, Ames, Iowa. Undated [1963]. $18.50.

For more than twenty years, Deam's monumental *Flora of Indiana* has been the standard against which state floras are judged. Now it has a worthy companion in Steyermark's *Flora of Missouri.* More than twenty-four hundred species are keyed, discussed, and mapped, and many are also illustrated. Dr. Steyermark has made a laudable and largely successful effort at an independent evaluation of the flora of the state, based on extensive field observation, herbarium study, and a consideration of the literature. When there is controversy, or where his interpretation differs from that in other treatments which might be consulted, he explains his views. One does not have to agree with every point to be convinced that each conclusion has indeed been individually considered instead of being merely copied from some other work.

One problem in an independent approach to the flora of an area no larger than Missouri is that of avoiding provinciality, and here I believe that the author has not been uniformly successful. The situation in Missouri is not always a true indication of the situation over the whole range of a species or group of species, and in a number of instances Dr. Steyermark might have reached different conclusions had he been studying a larger area.

Dr. Steyermark's specific concepts, as revealed in the flora, are in general accord with those of most modern American taxonomists. Throughout the work it is clear that he thinks of species as self-perpetuating natural populations which are consistently distinct and distinguishable. At the infraspecific level the situation is somewhat different. Many of the author's varieties are comparable to the varieties or subspecies of a majority of his colleagues, but many others appear to be purely technical segregates of dubious population significance. Dr. Steyermark also makes liberal use of formae, a practice which is going out of style. Thus in *Mertensia virginica* he recognizes three formae based on flower color, one pure white, one persistently pink, and one pink in bud but later turning blue. Those who prefer not to recognize such variants can, of course, ignore them, and we are properly warned by the taxonomic status (forma) to which he has assigned them.

The mass of information which Dr. Steyermark presents cannot be crowded into a manual of convenient size for field use. The book has a hundred more pages than the current Gray's Manual, and the pages are an inch larger each way. In the herbarium, classroom, or office, however, the size will be no handicap. Steyermark's flora will be successfully used for many years to come by professional botanists, students and amateurs with some botanical training.

ARTHUR CRONQUIST

FIELD GUIDE TO ROCKY MOUNTAIN WILDFLOWERS. Craigshead, John J., Frank C. Craighead, Jr., and Ray J. Davis. 277 pages, illustrated, indexed. Houghton Mifflin Co., Boston, Mass. 1963. $4.95.

The ability to identify wild flowers accurately to the genus and species is a skill which is intellectually rewarding but not easily attained. The number of species is too large for anyone to keep well in mind, and the characters that must be used to identify an unfamiliar species are often recondite. Once one has become familiar with a particular species, however, he can usually recognize it on sight, without recourse to the technical characters.

Books such as the present one fill a definite need for those who want to learn the names of wild flowers but have not the technical skill to use a flora prepared for professionals. About six hundred of the commoner and more conspicuous species of the region are treated. More than two hundred of these are illustrated with color photographs, and another hundred or so are shown in line drawings. Both common and scientific names are given. Relatively nontechnical descriptions and interesting comments are provided. There is also a formal key for identification, and an illustrated glossary to explain the terms used in it. Those who are qualified to use the key may prefer a more detailed treatment, but this book will fit easily into a jacket pocket, whereas a standard flora will not.

Some errors are unavoidable in the first printing of any book. Two which caught my attention are the illustration labeled *Fragaria vesca*, which shows instead a variety of *Fragaria virginiana*, and the illustration labeled *Solidago occidentalis*, which shows some other species of goldenrod.

ARTHUR CRONQUIST

HOW TO KNOW THE CACTI. Dawson, E. Yale. 158 pages, illustrated, indexed. Wm. C. Brown Co., Publishers, Dubuque, Iowa. 1963. $2.25 paper.

Distinguishing between cactuses, particularly of closely related genera or species, is no easy job. E. Yale Dawson makes it fun in his guide, with its pictorial keys. Helpfully, he limits himself to species of the United States and those which have been introduced. Introduced, as he understands it, includes foreign species most popular in pot cultivation as well as naturalized or in gardens. Britton and Rose nomenclature is used.

PHIL CLARK

CACTI AND SUCCULENTS, A PRACTICAL HANDBOOK. Haage, Walther (Translated by E. E. Kemp). 264 pages, illustrated, indexed. E. P. Dutton & Co. Inc., New York. 1963. $10.00

Cacti and succulents occupy an enormous field, and few books purporting to cover it do so either in a popular or a scientific manner. Most might better be titled "Cacti and Succulents I Have Known," so haphazard is their se-

(Continued on page 80)

BRIEF NOTES ON RECENT BOOKS

BIOGRAPHY AND HISTORY

EARLY ENGLISH GARDENS AND GARDEN BOOKS. Eyler, Ellen C. 48 pages, illustrated. (Folger Booklets on Tudor and Stuart Civilization) [Folger Shakespeare Library] Cornell University Press, Ithaca, N. Y. 1963. Paper, $1.00.

The first of a series of booklets from the Folger Shakespeare Library in Washington, D. C. This library has a remarkable collection of books, pamphlets, and manuscripts pertaining to the cultural history of the sixteenth and seventeenth centuries. This horticultural literary gem is illustrated with reproductions from the works of Gerard, Parkinson, Lawson, Thomas Hill, Crispin van de Passe, de Bry, Jacob Cats, Jan van der Green, and Gervase Markham.

EXPLORING WITH THE BARTRAMS. Sutton, Ann and Myron. 224 pages, illustrated, bibliography, indexed. Rand McNally and Co., Chicago, 1963. $3.95.

Older boys and girls, or, as they prefer to be called, "young adults," will thoroughly enjoy this dramatic story of two (father and son) early American plant explorers, John and William Bartram. The authors of this fascinating biography are professional naturalists—Ann Sutton is a geologist with the U. S. Geological Survey and her husband is Director of the National Park Service. They have employed a style of writing (with the characters that they are presenting, speaking and acting their own parts) which sparks their books with a vital freshness and spontaneity.

JOHN LYON, NURSERYMAN AND PLANT HUNTER, AND HIS JOURNAL, 1799-1814. Ewan, Joseph and Nesta. (American Philosophical Society Transactions, new series, vol. 53, pt. 2) The American Philosophical Society, Philadelphia. 1963. Paper, $2.00.

This fine biographical-bibliographical contribution of Joseph and Nesta Ewan bears the stamp of their usual meticulous and extensive research. Those who are interested in American horticultural history will read with interest John Lyon's Journal, 1799-1814, and also the extensive footnotes and portrayal of an early nineteenth-century nurseryman, who was said to have introduced thirty-one American plants into cultivation.

INSECTS

GENERAL AND APPLIED ENTOMOLOGY, 2nd ed. Little, V. A. 543 pages, illustrated, bibliography, indexed. Harper and Row, New York. 1963. $7.50.

A clearly written, well-illustrated introduction to the study of insect morphology, physiology, and taxonomy, together with up-to-date information on insecticides. The original edition appeared in 1957.

INSECTS AND THEIR WORLD. Oldroyd, Harold. 139 pages, illustrated, bibliography, indexed. (Phoenix Books) University of Chicago Press, Chicago. 1963. Paper, $1.50.

A North-American edition of a semipopular booklet written by an internationally recognized entomologist, who is associated with the British Museum (Natural History). This is not an identification guide, but rather a readable account of the morphology, physiology, and behavior of insects, both beneficial and harmful, with examples given of the more commonly known North American types.

VOCATIONS

CAREERS IN CONSERVATION: OPPORTUNITIES IN NATURAL RESOURCES. Clepper, Henry. 141 pages, illustrated, bibliography, indexed. (Ronald Science Library) Ronald Press Co., New York. 1963. $3.75.

A comprehensive vocational guide for young persons interested in soil conservation, wildlife and fishery management, forestry, range management, watershed management, and park development. It includes an extensive list of university and colleges which offer natural-resource instruction with specific courses noted under each institution.

CONSERVATIONISTS AND WHAT THEY DO. Harrison, C. William. 170 pages, bibliography, indexed. Franklin Watts, New York. 1963. $3.95.

Theodore Roosevelt once said that conservation meant "the wise use of our natural resources so that the greatest number of people will benefit for the longest possible time." In *Conservationists and What They Do*, Mr. Harrison describes and discusses the many fields that are open to young persons who are seeking a vocation which is closely allied to wildlife preservation. Among these fields are forestry, mining, farming, engineering, law enforcement, fire control, and public health.

FORESTERS AND WHAT THEY DO. Perry, John and Jane G. 182 pages, bibliography, indexed. Franklin Watts, New York. 1963. $3.95.

The authors of this exciting career book set out on an eight-thousand-mile expedition for the purpose of talking with American foresters and their families—about their life, the satisfactions and hardships. They met with cordial hospitality, and they learned that there is a real need for the right kind of young people to be educated for the many diversified jobs relating to forestry. The Perrys have written their book in a narrative style, which is bound to hold the interest of the reader who will find much useful information within its covers.

HANDBOOK OF AGRICULTURAL OCCUPATIONS (PREPARATION FOR TECHNICAL AND PROFESSIONAL WORK IN AGRICULTURE). Hoover, Norman K. 254 pages, illustrated, indexed. Interstate Printers and Publishers, Danville, Ill. 1963. $4.50.

There is helpful advice for high school boys and girls in this handbook of agricultural occupations. They will learn that agriculture is not only farming but represents a tremendous industry with many interesting facets, employing semiskilled, skilled, technical, and professional workers. Many opportunities exist for those who are not able to go to college. In this manual are listed institutions which offer instruction in agriculture at the college level, also, examples of short courses, winter courses, two-year programs, and correspondence courses.

BOOKS FOR YOUNGER READERS

ABOUT INSECTS THAT HELP PLANTS. Gibson, Gertrude H. 47 pages, illustrated, indexed. (Look, Read, Learn Books) Melmont Publishers, Chicago. 1963. $2.50.

This cleverly illustrated "easy reading" book has to do with insects which are the gardener's friends—those that aerate the soil, those that eat harmful insects, and those that are pollen carriers and help to fertilize the plants.

ABOUT NUTS. Russell, Solveig P. 32 pages, illustrated. Melmont Publishers, Chicago, Ill. 1963. $2.50.

Sixteen well-known edible nuts are illustrated and described in an attractive style which should interest primary graders.

ADVENTURES WITH INSECTS. Headstrom, Richard. 221 pages, illustrated. J. B. Lippincott Co., Philadelphia, Pa. 1963. $4.25.

Another of Richard Headstrom's fascinating "adventures" books for the preteen set. Here are thirty-nine adventures concerning insect eggs, cocoons, flight operations, manners of feeding, sounds and colors—insects as masons, tentmakers, carpenters, and engravers.

THE AMERICAN INDIAN AS FARMER. Morris, Loverne. 47 pages, colored illustrations, indexed. (Look, Read, Learn Books) Melmont Publishers, Chicago. 1963. $2.50.

Instructive stories about our North American Indian farmers—the Cherokees of the Southeast, the Iroquois of the Northeast, and the Mandans of the Plains—and their crops of maize, pumpkins, squash, beans, peanuts, potatoes, sweet potatoes, peppers, and tomatoes.

APPLE ORCHARD. Eberle, Irmengarde. 39 pages, illustrated. Henry Z. Walck, New York. 1962. $3.00.

A charming story of an apple orchard in New York State and of the life of the apple farmer and his helpers. Written for the seven-to-ten age level.

DOWN THE MOUNTAIN: A BOOK ABOUT THE EVERCHANGING SOIL. Bartlett, Margaret F. 63 pages, illustrated (part colored). (Young Scott Books) William R. Scott, New York, N. Y. 1963. $3.25.

At the Dalton School in New York City, Miss Bartlett's favorite age group is the very young "where native curiosity is unhampered." In this little book she takes her tiny readers mountain climbing and helps them to discover the difference in rocks and soil which they see at different places down the mountainside.

EVERYDAY INSECTS. Allen, Gertrude E. 48 pages, illustrated. Houghton Mifflin Co., Boston. 1963. $2.50.

Six common insects, accurately presented in picture and text, for the enjoyment and education of youngsters who are just beginning to read—grasshopper, ladybug, bumblebee, dragonfly, wasp, and butterfly.

EXPLORING THE WORLD OF SOCIAL INSECTS. Simon, Hilda. 119 pages, colored illustrations, indexed. The Vanguard Press, New York. 1963. $3.95.

In the foreword of this charming volume Dr. Alexander B. Klots, of The American Museum of Natural History, pays a glowing tribute: "I think is is perfectly miraculous that Miss Simon has managed to produce a work, dealing with one of the most misunderstood subjects in all entomology, that covers the field so well, simplifies and yet avoids the usual pitfalls. Furthermore, I am delighted with her illustrations, which, with their great fidelity, sensitivity, and spirit, would grace any book anywhere . . ."

FOREST FIRE. Judge, Frances. 143 pages, illustrated, indexed. Alfred A. Knopf, New York. 1962. $3.00.

This story of fire fighting and fire prevention in our great forested areas is full of thrills, tragedy, and bravery. The author, wife of a forest ranger, has lived in Glacier National Park in Montana, in Grand Teton National Park in Wyoming, and in Bandelier National Monument in New Mexico. Her son spent a summer, when he was nineteen, as a smoke jumper for the Forest Service. She writes, "It can be said that we all have lived and breathed forest fire. My weapons against it—a typewriter and a pen."

A FRESH LOOK AT FLOWERS. Allen, Laura Jean. unpaged, colored illustrations. Franklin Watts, New York. 1963. $2.50.

A flower-picture book for the tiniest of tots.

GREG'S MICROSCOPE. Selsam, Millicent E. 64 pages, colored illustrations. (A Science I Can Read Book) Harper and Row, New York. 1963. $1.95.

What did little Greg see when he looked through his new microscope—sugar, salt, flour, threads, and hairs—just common, ordinary, every day things changed, as if by magic, into fantastic shapes which he had never seen before. This picture-story book (for the four-to-eight-year-old group) is very easy to read and to understand.

GEORGE WASHINGTON CARVER: NEGRO SCIENTIST. Epstein, Samuel and Beryl. 79 pages, colored illustrations. (A Discovery Book). Grosset and Dunlap, New York. 1963. $1.00.

The newspapers called him "The Wizard of Tuskegee"—the negro scientist who made "300 things out of peanuts . . . and 118 things . . . out of sweet potatoes." An easy-to-read story.

THE HOW AND WHY WONDER BOOK OF WILD FLOWERS. Ferguson, Grace F. 48 pages, illustrated (part colored). Wonder Books, New York. 1962. Paper, $.50; Cloth, $1.00.

A very good "first" book in botany, and although written for children it is recommended for adults who are just beginning to botanize. It offers simple explanations of: what plant families are; what differences exist between the buttercup and the rose families; why insects are so important to flowers of the orchid family; and so on.

INSECT-EATING PLANTS. Poole, Lynn and Gray. 87 pages, illustrated, indexed. Thomas Y. Crowell Co., New York. 1963. $3.50.

We all know that the man-eating tree of Madagascar is a tall, tall story, but several kinds of plants really do seem to thrive on an insect-meat diet. These carnivorous plants—sundews, Venus' flytraps, pitcher plants, and bladderworts—are described and well illustrated, with simple directions given on the care and proper feeding of them in the home terrarium.

INSECTS. Brouillette, Jeanne S. 29 pages, colored illustrations. (Follett Beginning Science Book) Follett Publishing Co., Chicago. 1963. $1.00.

There is something mysterious about an insect which appeals to even the youngest child. This colorful picture-story book should delight as well as inform the seven-to eight-year-olds.

INSECTS AND PLANTS: THE AMAZING PARTNERSHIP. Cooper, Elizabeth K. 153 pages, illustrated, indexed. Harcourt, Brace and World, New York. 1963. $3.00.

To read a book from the pen of Elizabeth Cooper is always time well spent, because her contagious enthusiasm, blended with scientifically accurate facts, opens up curious vistas which are new to many of us. Her latest title is concerned with insect-plant partnerships, called symbiosis. The cleverly drawn illustrations are by Shirley Briggs.

J. STERLING MORTON; ARBOR DAY BOY. Moore, Clyde B. 200 pages, illustrated. (Childhood of Famous Americans) The Bobbs-Merrill Co., Indianapolis. 1962. $2.25.

The biography of another interesting character J. Sterling Morton who proposed in 1872 that a special day, Arbor Day, be set aside in Nebraska for planting trees. From this beginning the observance of Arbor Day is now becoming established across our country.

JUNIOR GARDEN CLUB HANDBOOK: A LEADER'S GUIDE. Peeples, Fannie H. 208 pages, illustrated, bibliography, indexed. D. Van Nostrand Co., Princeton, N. J. 1963. $5.95.

Probably no one at the present time has had more experience in junior garden club leadership than the author of this very useful manual. When Mrs. Peeples served as National Chairman of Junior Gardening for the National Council of State Garden Clubs, she prepared a series of booklets to help potential leaders of junior groups. This book is an outgrowth of these guides.

LIVES OF AN OAK TREE. Hutchins, Ross E. 64 pages, colored illustrations, indexed. Rand McNally and Co., Chicago. 1962. $2.95.

Delightful pictures in color embellish a simply told story of the life-history of an oak tree which gave shelter to a host of wild life. This should appeal to very young readers.

LUTHER BURBANK; PARTNER OF NATURE. Faber, Doris. 80 pages, colored illustrations. Garrard Publishing Co., Champaign, Ill. $2.50.

Another of the adventurous, historical Discovery Books series written for children in the primary grades. Mrs. Faber tells a fascinating story of the boyhood and manhood of the famous plant breeder who is said to have discovered over two hundred and fifty new fruits, not to mention the mammoth Burbank potato and the spineless cactus.

THE MAN WHO FOUND OUT WHY: THE STORY OF GREGOR MENDEL. (Webster, Gary, pseud.) Garrison, Webb B. 188 pages, illustrated, indexed. (Credo Books) Hawthorn Books, New York. 1963. $2.95.

Gary Webster in "real life" is Dr. Webb B. Garrison, the pastor of the Downtown Roberts Park Church in Indianapolis. He has written for youngsters this splendid biography of the Augustinian monk, known as the father of the science of genetics, who discovered through his research with garden peas an important law of inheritance.

NAMING LIVING THINGS: THE GROUPING OF PLANTS AND ANIMALS. Riedman, Sarah R. 128 pages, colored illustrations, indexed. Rand McNally and Co., Chicago. 1963. $3.50.

An excellent, elementary introduction to the study of the classification of plants and animals. A complicated and confusing subject skillfully presented with clear definitions and good examples. Interesting thumb-nail sketches of some of the famous systematists, such as, Aristotle, Mathias de l'Obel, Linnaeus, Tournefort, Lamarck, and Darwin.

PLANTS WITH SEEDS. Wood, Dorothy. 32 pages, colored illustrations. (A Follett Beginning Science Book) Follett Publishing Co., Chicago, 1963. $1.00.

Very little children can learn a great deal from this attractively illustrated, simply written book about plants which produce flowers and seeds which are important sources of food, medicine, clothing, paper, and lumber.

RAIN, RIVERS AND RESERVOIRS: THE CHALLENGE OF RUNNING WATER. Archer, Sellers G. 120 pages, ilustrated, bibliography, indexed. Coward-McCann. New York. 1963. $2.95.

Here is a stimulating little book on water conservation, illustrated with good photographs and written for those in their early teens by one of our "top" government specialists.

SCIENTISTS WHO WORK OUTDOORS. Poole, Lynn and Gray. 178 pages, illustrated, indexed. (Makers of Our Modern World) Dodd, Mead and Co., New York. 1963. $3.50.

A fine selection of thirteen short biographical sketches of "outdoor" career men and women who have made noteworthy contributions to science, by the authors of *Scientists Who Changed the World* (Dodd, Mead and Co., 1960).

STARS, MOSQUITOES AND CROCODILES: THE AMERICAN TRAVELS OF ALEXANDER VON HUMBOLDT. Selsam. Millicent E., ed. 170 pages, illustrated, bibliography. Harper and Row, New York. 1962. $3.50.

This book will appeal to older boys and girls. It contains selections from the American travel journals of one of the world's great scientific collectors and explorers. Mrs. Selsam has done a fine piece of work by interspersing the direct quotations from the journals with interpretations, explanations, and biographical notes.

THE STORY OF JOHNNY APPLESEED. Aliki. unpaged, illustrated (part colored). Prentice Hall, Englewood, N. J. 1963. $3.50.

Nobody knows how many old apple trees grew from the seeds that John Chapman (alias Johnny Appleseed) scattered on his legendary travels to the West from his home in Massachu-

setts. This delightful story has been written and cleverly illustrated for very young children by one who signs herself "Aliki." [The surname is Brandenberg.]

THE STORY OF OUR EARTH. Strahler, Arthur N. 56 pages, illustrated (part colored), indexed. (Finding Out Books) Home Library Press, New York. 1963. $2.95.

This elementary, up-to-date geology text has been written for young readers by an eminent geomorphologist. It is generously illustrated with excellent photographs, diagrams, and maps.

THIS IS A FLOWER. Hutchins, Ross E. 152 pages, illustrated, indexed. Dodd, Mead and Co., New York. 1963. $3.50.

Flowers and their many numerous parts, in almost every conceivable shape and form, are described and presented with marvelous photographs (many of which are close-ups) which have been taken by the author himself. The entertaining text is abounding in intriguing facts concerning the multitudinous reasons for a flower's existence.

WHO GOES THERE IN MY GARDEN? Collier, Ethel. unpaged, colored illustrations. (Young Scott Books) William R. Scott, New York. 1963. $3.25.

A delightful story, with cleverly drawn pictures, of a little boy who bought some seeds with his birthday money and grew a fine garden of flowers and vegetables—all told with a vocabulary that first-graders can understand and enjoy.

WILDLIFE TEAMS. Friendly, Natalie. 62 pages, illustrated, indexed. (P-H Junior Research Books) Prentice-Hall, Englewood Cliffs, N. J. 1963. $2.95.

Symbiosis is just another name for Natalie Friendly's plant and animal friendships — her wildlife teams. A fine example of the "plant-pal" combination is the lichen which is part alga and part fungus.

THE WONDERFUL WORLD OF PLANTS AND FLOWERS. Swift, Howard. 56 pages, illustrated (part colored), indexed. (Finding-out Books). Home Library Press, New York. 1963. $2.95.

What a pleasant surprise to discover that a former staff member of The New York Botanical Garden, and at present Assistant Director of The Garden Center of Greater Cleveland, is the author of this delightful botany book for youngsters. Easy experiments are interspersed throughout the text with a concluding chapter devoted to collecting, pressing, and mounting plant specimens for a home herbarium.

FLOWERS

GARDEN FLOWERS. Meikle, R. D. and others. 479 pages, illustrated, glossary, indexed. St. Martin's Press, New York. 1964. $7.95

This is the fourth volume in the Kew Series, planned, written, and edited by the botanical staff of the Royal Botanic Gardens as a practical guide for students of plant science and plants, and also for nature lovers. As with the earlier companion volumes, *Garden Flowers* is presented according to the accepted principles of systematic botany, with key to genera preceding the concise descriptions of the plants given under their respective plant families, with information on habitat and distribution and a brief reference to use in the garden.

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GARDENING

THE GARDENER'S YEAR. Capek, Karel. 110 pages, illustrated. Dover Publications Inc., New York. 1963. $1.00 paper.

An "unabridged, unaltered republication" of a delightful little book, first published in 1931. The author, a Czech novelist and dramatist and an enthusiastic amateur gardener, gently mocks the trials and tribulations and the joys of gardening.

AMERICAN HOME GARDEN BOOK AND PLANT ENCYCLOPEDIA. Editors and Staff of The American Home. 512 pages, illustrated, indexed. E. M. Evans & Co., Inc., New York. 1964. $7.95.

The first section is devoted to a wide range of subjects, including soil, fertilizer, propagating, pruning, weed control, trees, shrubs, vines, lawns, ground covers, house plants, terrariums and dish gardens, greenhouses and cold frames, annuals, perennials, bulbs, and so on. The second section, "The Plant Encyclopedia," is a description, in alphabetical order, of some two thousand popular and useful plants.

SHRUBS, TREES, VINES

EFFECTIVE FLOWERING SHRUBS, 3rd ed. Haworth-Booth, Michael. 350 pages, 47 color plates, indexed. St. Martin's Press, New York. 1962. $6.50.

This third edition bears the publication date of 1962, but did not reach this book review department until January, 1964. It is an informative account of species and varieties of shrubs, large and small, in the order of flowering from spring through fall—interesting and useful to gardeners here as in England, provided they remember the differences in climatic conditions and that not all the shrubs described are available to them.

MISCELLANY

HERBS AND SPICES FOR HEALTH AND BEAUTY. Colin, Jane. 96 pages. Charles T. Branford Co., Newton Centre, Mass. 1963. $2.95.

From alecost (costmary) through the alphabet to zedoary *(Curcuma zedoaria)* this little book, now in its second printing, serves as a guide to the cosmetic, culinary, and medicinal uses of herbs and spices readily available. The author also makes delightful reference to properties attributed by superstition.

FOLK WINES, CORDIALS, AND BRANDIES. Jagendorf, M. A. 414 pages, illustrated, bibliography, indexed. The Vanguard Press, Inc., New York. 1963. $10.00.

Recipes for making and advice on enjoying wines, cordials, and brandies, accompanied by fascinating reminiscences and folk lores and by enchanting line drawings and other illustrations from old manuscripts and herbals. Although Dr. Jagendorf has had a successful career in dentistry, he has apparently found greater satisfaction in writing and is the author of a series of delightful folk tales from the Old and New Worlds, of poems and plays as well as this latest work.

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NEWS AND NOTES (Continued from page 74)

Alice Dustan Kollar, landscape architect, author of the popular book *Landscaping Your Own Home* published by Macmillan, and a resident of Morristown, has drawn the plans for the garden design. She consulted Mrs. Philip Foster, Editor of *The Herb Grower Magazine*, on plants to be included in the eighteenth-century garden. Mrs. Foster is a former resident of Morristown.

Both culinary and medicinal herbs of the period will be used in the planting with special emphasis on plants familiar today as drug herbs, such as digitalis or foxglove, *Colchicum autumnale*, still used in treatment of gout, and hellebore or Christmas-rose. The Morristown Chapter of the Daughters of the American Revolution will cooperate with the Home Garden Club in this tercentenary project. Native plants used by the Indians and by the early doctors will be worked into the garden with those of the more formal period such as boxwood, santolina, and germander.

Historic Garden Week in Virginia will take place April 18-25, 1964. Proceeds from the previous thirty annual Historic Garden Weeks, amounting to well over half a million dollars, have been devoted to restoring historic shrines and their grounds and gardens.

The current restoration, now nearing completion, is located on the campus of the University of Virginia in Charlottesville—the gardens on the East Lawn designed by Thomas Jefferson. The gardens on the West Lawn, also designed by Jefferson, were restored by the Garden Club of Virginia and presented to the University in 1951.

Information on the houses and gardens may be obtained by writing to Historic Garden Week in Virginia, Hotel Jefferson, Room 3, Richmond, Virginia.

Bitter lemon, no! Bitter melon, yes! Inadvertently the letters were transposed in the caption accompanying the photograph of *Momordica charantia* on page 14 of the January-February, 1964, issue of *The Garden Journal*.

The Hackensack Audubon Society of Bergen County, New Jersey, visited The New York Botanical Garden in January, 1964, on a delightfully clear and cold day. The party of thirty-six members was led by Daniel A. Roser, Director and Conservation Chairman and Past President of the Society, and Naturalist of Greenbrook Sanctuary. This annual field trip is eagerly looked forward to by these intrepid bird watchers.

Ed Maguire, employee of the Botanical Garden, advised them about birds likely to be seen. Twenty-two species were observed, including red-tailed hawk, robin, red-breasted nuthatch, hairy woodpecker, and fox sparrow. The long-eared owl and white-winged crossbills eluded them, however, in spite of a thorough search of the habitats.

Of special interest were the several potholes on a ledge overlooking the Bronx River.

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BOOK REVIEWS (Continued from page 76)

lection. Walter Haage, however, has produced a guide which truly surveys the field for the beginner. A large proportion of the succulent plants in commerce and cultivation are included. More important, with the aid of 680 wonderfully clear line drawings and 48 pages of color, the book distinguishes between look-alike genera. Cultural directions are common sense, lack the fussy ideal demands few home growers can provide. The book's simplicity and its clarity will make the already popular cactus and succulent hobby more popular. It's too bad, though, more wasn't said about agaves; only four of the three hundred species are illustrated. Nomenclature is based on Britton and Rose and Curt Backeberg.

PHIL CLARK

THE MAX SCHLING BOOK OF INDOOR GARDENING. Brandon, Dorothy and Alfred F. Scheider. 314 pages, illustrated, indexed. Ivan Obelensky Inc., New York. 1963. $6.50.

It is sad that the text neither fulfills the promise of the title nor equals the high quality of the photographs that illustrate it. Some of the most popular house plants are missing—where, for example, are the common inch plants or their less common cousins, the setcreasias, which are enjoying growing popularity? Hats off, though, to the photographers, Walter Singer and Sandak Inc., for their numerous and excellent photographs, which alone make the book worth while.

PHIL CLARK

THE MICROBIAL WORLD. 2nd ed. Stanier, Roger Y., Michael Doudoroff, Edward A. Adelberg. 753 pages, illustrated, indexed. Prentice-Hall Inc., Englewood Cliffs, N. J. 1963. $13.35.

The Microbial World is concerned with microscopic plants, chiefly bacteria, in their natural and biological setting. It is an excellent book, written in language so clear and simple that it may be read with understanding by the non-biologist, as well as by the biology student for whom it is intended.

ALMA W. BARKSDALE

CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS. Gleason, Marion M., Robert E. Gosselin, and Harold C. Hodge. 1196 pages, bibliography, indexed. The Williams and Wilkins Co., Baltimore, Md., 1963. $22.00.

The second edition of this monumental work includes sections on first aid and general emergency treatment, ingredients index, therapeutic index, supportive treatment, trade name index, general formulations, manufacturers' names and addresses, and classification of poisons. To facilitate its use each section is printed on paper of of a different color. A color chart in the Frontispiece also shows how best to use this book. This is a valuable book for practicing physicians, poison control centers, and for all who manufacture or handle toxic materials.

P. P. PIRONE

BIOCHEMICAL SYSTEMATICS. Alston, Ralph E., and B. L. Turner. 404 pages, illustrated, indexed. Prentice-Hall Inc., Englewood Cliffs, N. J. 1963. $13.25.

During 1962 and 1963 three separate treatises on chemical taxonomy appeared. Each of these presents the subject from a different point of view, and it seems advantageous to consider Alston and Turner's book by comparing it to the others. Hegnauer's *Chemotaxonomie der Pflanzen*, of which two volumes have appeared so far, is organized on the basis of taxonomic groups and the constituents of each. *Chemical Plant Taxonomy*, edited by Swain, is a collection of reviews by different authors, each discussing a different class of compounds and its distribution. Alston and Turner's book is less comprehensive than the other two, but it is the most philosophical in its approach. The authors have made a real effort to "consider perspectives in biochemical systematics," and this is apparent as a unifying thread throughout the book. *Biochemical systematics* is not so much a reference book as an introduction to (or perhaps indoctrination in) chemical taxonomy.

MARJORIE ANCHEL

CEREAL CROPS. Leonard, Warren H., and John H. Martin. vii + 324 pages. Illustrated, indexed. The Macmillan Company, New York. 1963. Price $10.00.

This is a textbook for students of advanced undergraduate standing, describing in detail the most important cereal crops. In six parts and twenty-two chapters, the book includes a discussion of the economic role of the cereals, botany, cultural practices, machine applications for cereal production, storage problems, and diseases and pests. The book will serve as a useful reference source for those generally interested in the cereal crops.

DAVID J. ROGERS

PESTS OF STORED GRAIN AND GRAIN PRODUCTS. Cotton, Richard T. 318 pages, illustrated, bibliography, indexed. Burgess Publishing Co., Minneapolis, Minn. 1963. $5.00.

This edition of this popular book updates control measures and includes some new pests which have appeared since earlier editions. This is a valuable book for farmers who store grains, for grain-storage operators, and for pest-control companies.

P. P. PIRONE

LETTERS TO THE EDITOR

I do not remember any picture in *The Garden Journal* which has the impact of the back-cover photograph in the January-February issue. If any justification were needed for maintaining a conservatory, you provided it in the record of those wondering faces. (For a brief moment I was deceived into thinking that the picture had been made in a Central American jungle—but how did all those New York kids get there?) Thank you for an inspired piece of work.

ALEXANDER L. CROSBY
Quakertown, Penn.

I enjoyed "Conversations in Ecology" in the 1963 issues of *The Garden Journal*. But I must confess that I also enjoyed reading the magazine . . . I am enclosing a check as I wish to receive the 1964 issues.

I was pleased to become acquainted with Dr. Egler. I never really knew who he was, even though I was much impressed by an article by him in the '42 *Philosophy of Science*, entitled "Vegetation as an Object of Study." Parts of it became embodied in two of my term papers in graduate school.

I hope that you will be able, in 1964, to encourage other ecologists to submit the type of papers that were published in the 1963 issues of *The Garden Journal*—this type of material and presentation are what botany in general and ecology in particular can well use in this day and age.

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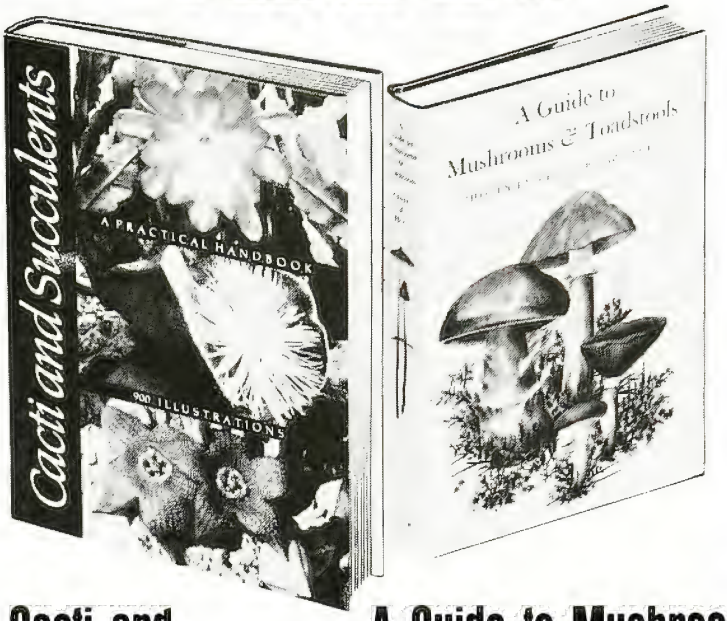

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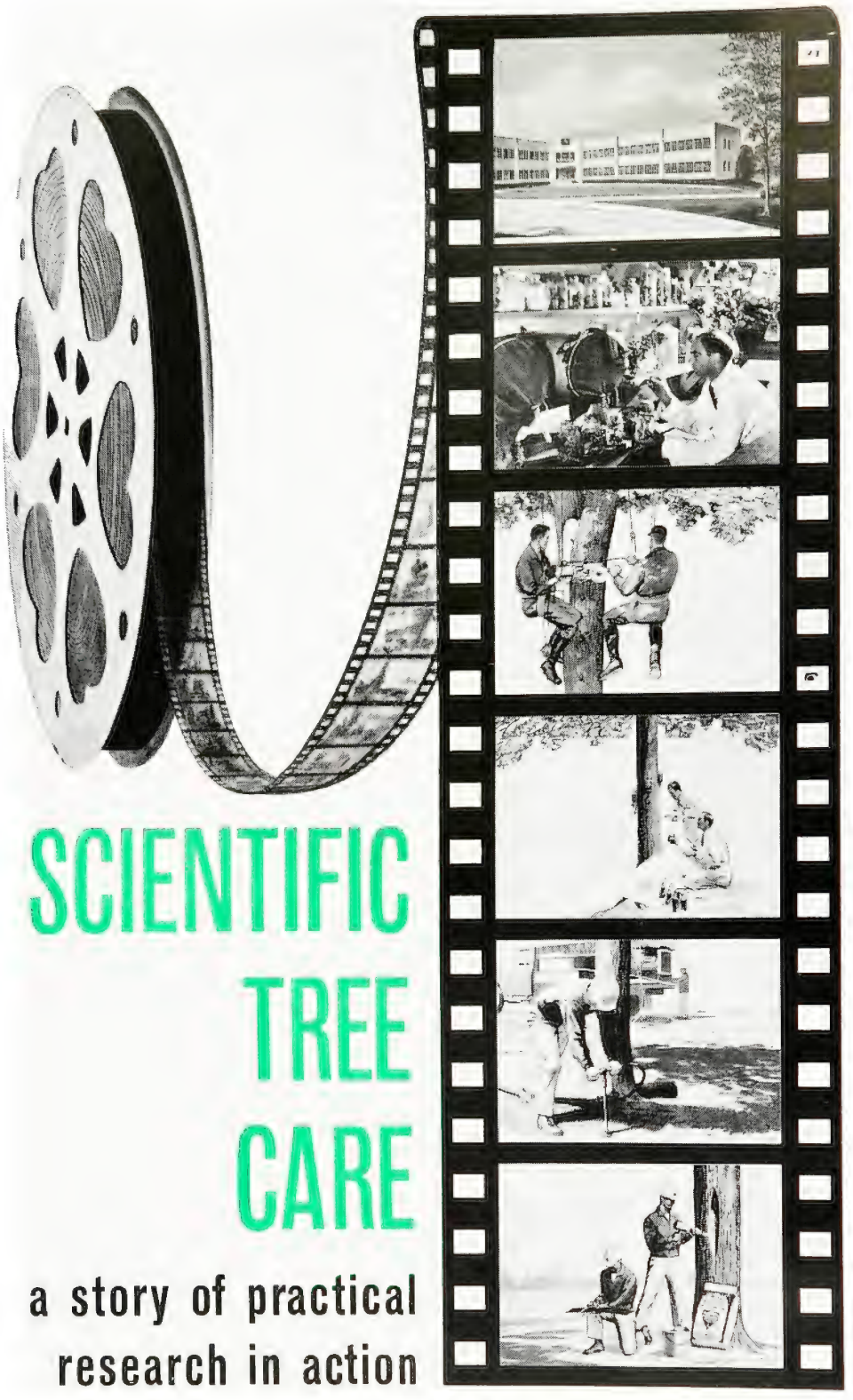

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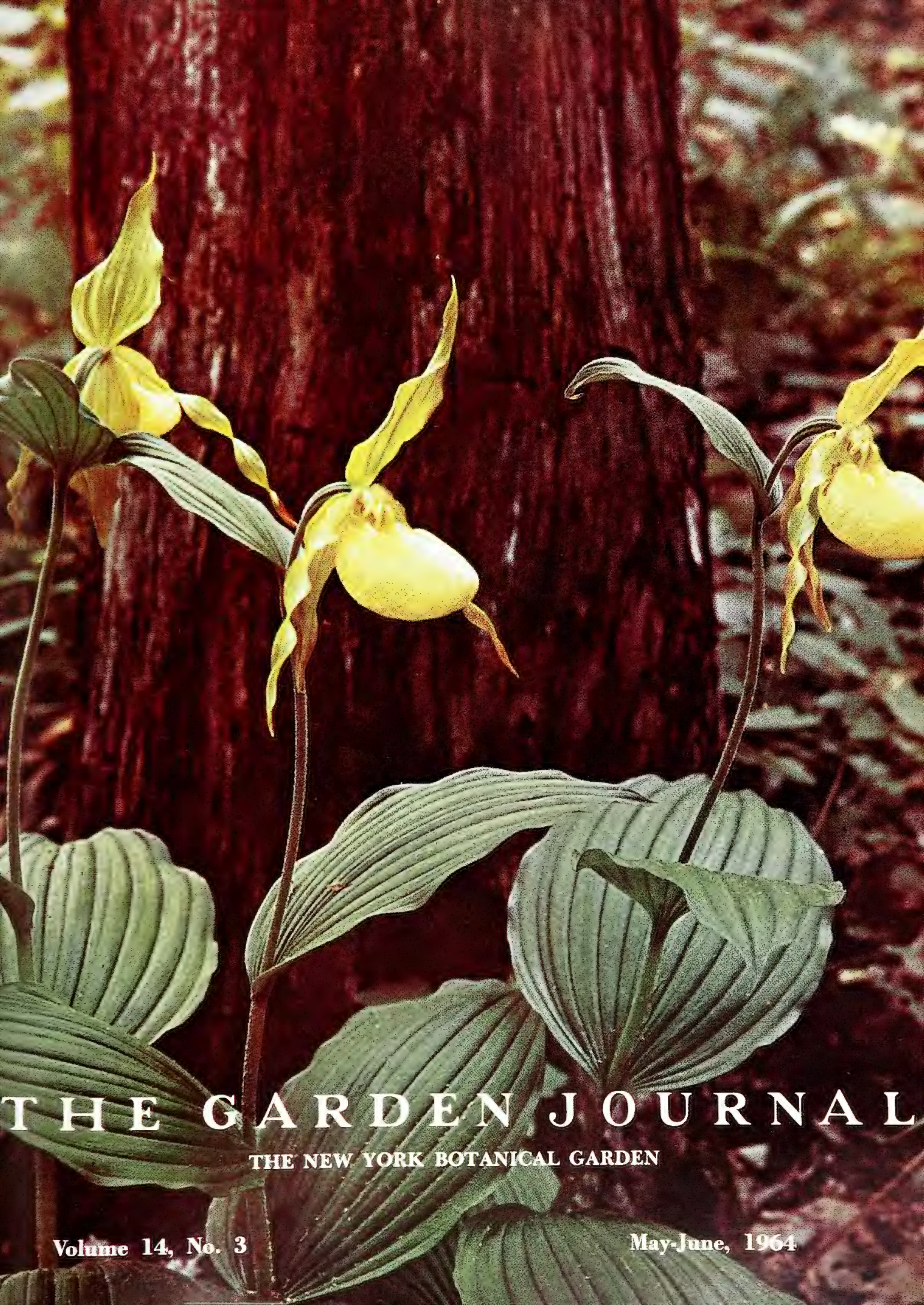

THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

Volume 14, No. 3 May-June, 1964

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Amaryllis pardina.

Amaryllis reticulata var. *striatifolia.*

SOME UNUSUAL AMARYLLIS

By Ira S. Nelson

Mr. Nelson is Professor of Horticulture at the University of Southwestern Louisiana, Lafayette.

Hybrid amaryllis have a long history as pot plants and in the milder climates as garden subjects. The first recorded amaryllis hybrid, *Amaryllis* × *johnsonii,* appeared in England in 1799. This same hybrid has persisted and may be seen today in private gardens and public plantings in Louisiana and elsewhere in the Deep South. While the English hybridizers are responsible for much of the early groundwork in amaryllis breeding, the superb modern hybrids represent for the most part exquisite refinements accomplished by contemporary Dutch horticulturists.

It was not until after World War II that American gardeners began to grow the modern Dutch hybrids. Almost immediately enthusiasm for them reached great heights. Amaryllis clubs were formed, competitive shows were held, and amateur hybridizers eagerly used the best Dutch cultivars for improving their own strains. The superiority of the Dutch hybrids over existing American strains touched off the wave of popularity which amaryllis enjoy today.

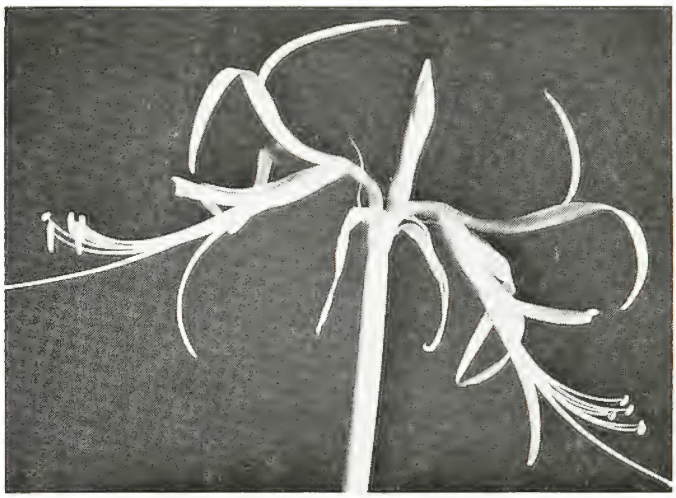
Offhand it appears that there is little need for more amaryllis breeding with the abundance of fine Dutch cultivars and the many seedlings being produced from them in this country. However, such is not so. In talking with gardeners, I have found that not all share the same enthusiasm for amaryllis. In fact, a rather substantial majority do not grow them at all. The answer to this lies in the basic fact that we do not all have the same notions about beauty. The very characteristics which endear the Dutch hybrids to some make them unacceptable to others.

Because amaryllis have so many desirable attributes, such as ease of culture, floriferousness, long-lasting and good shipping qualities, wide range of flower color, it occurred to me that perhaps new types could be produced which would retain these desirable characteristics and yet present completely different aspects which would appeal to at least a segment of the gardeners who do not grow amaryllis.

A look at the botanical literature reveals that the genus *Amaryllis* does indeed accommodate a wide assortment of species, many of which bear little superficial resemblance to the modern Dutch hybrids or to any of the known cultivated amaryllis. I became infatuated with the idea of producing something entirely new and different in amaryllis, but I must confess that I had only the haziest of ideas about what that would be.

As a start I decided to assemble a living collection of all the known species from which I could select for breeding purposes those species that had the characteristics I wanted to use. Had I known how difficult this task was, I would have dropped the whole project at that point. The bittter truth concerning the enormity of my preliminary objective did not dawn on me for two full years, during which time I was able to procure living bulbs of only three species. Two of these were found growing locally and the third was purchased from a California dealer. This was most frustrating, considering the fact that I had written to botanical gardens, botanists, and horticulturists on four continents for bulbs or seeds of the species.

Just before I lost hope of ever piecing together a collection of *Amaryllis* species, the winds of fortune changed. The story of the amaryllis here illustrated is but a segment of a larger story about the Louisiana Society for Horticultural Research, an organization of amateur horticulturists who know what they want to accomplish and how to get on with the job. In slightly less than ten years of existence this organization has supported three plant exploration expeditions—two to South America and one to Mexico. I have had the good fortune not only to participate in both South American ventures, but also to have access to the plant material from them for hybridizing. It has been high adventure to share the aspirations, disappointments, and successes of this group which is doing things horticulturally in the South.



Top row, left, *Amaryllis starkii;* right, *A. blumenavia.*

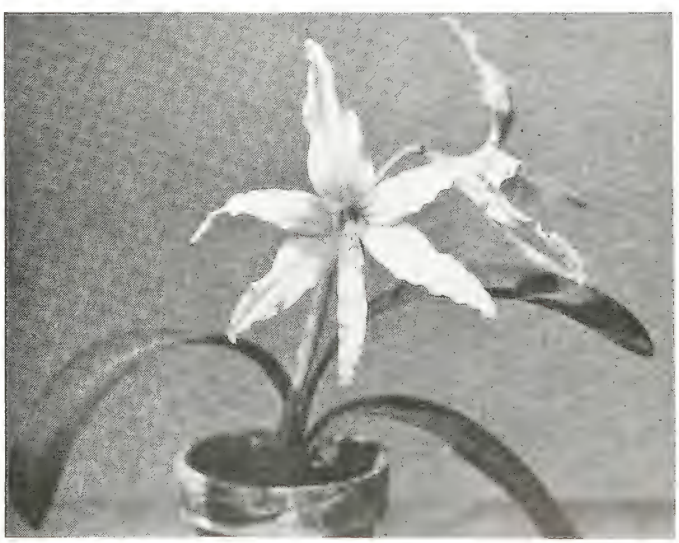
Center, *Amaryllis cybister.*

Bottom row, left, *Amaryllis striata;* right, *A. evansiae.*

The motivating force behind its efforts is a desire to increase the variety and improve the quality of ornamental plants in southern gardens. In the fall of 1954 the newly organized Louisiana Society for Horticultural Research, together with the University of Southwestern Louisiana, sponsored a plant exploration expedition to South America which had as a prime objective the reintroduction of *Amaryllis* species to cultivation. While on this trip I was able to collect several species which had long been lost from cultivation and one which had not been previously recorded. A second trip, which was sponsored by the same agencies in 1958, yielded additional lost species and yet another undescribed one.

The collection has been augmented by bulbs from Dr. Martin Cardenas of Bolivia, Dr. Hamilton P. Traub of La Jolla, California, and others. In recent years a Florida bulb importer has been a source of several Brazilian species. Thus at last our species collection is quite good, although it is still incomplete.

Space will not permit writing about all of the species in our collection nor their hybrids. Those that I have selected



Top, Kohlmeyer Hybrids (*Amaryllis pardina* × *A. striata*).
Center, Senorita Hybrids (*A. striata* × *A. evansiae*).
Bottom, Kerper Hybrids (*A. vittata* var. *tweediana* × Ludwig's Strain of white Dutch hybrids).

for this article illustrate some of the characteristics of horticultural interest not found in the modern Dutch and American hybrids.

While contemporary amaryllis breeders have been concentrating on producing flat-faced flowers, the long-trumpet species have been neglected. *Amaryllis elegans* Sprengel and its allies offer great possibilities for the production of a whole class of long-trumpet sorts. Within this alliance there is far more breeding potential than anyone can exploit in a lifetime. *A. viridiflora* (Rusby) Traub & Upholf, the green-flowered species, and *A. elegans* var. *divifrancisci* Cardenas, with its chartreuse flowers, offer tantalizing prospects for green-flowered cultivars in all classes.

Amaryllis striata Lamarck is the easiest of the species to come by. For unknown reasons this species persists in hand-me-down pot plant collections which have been in families for years. The few botanical gardens which grow any amaryllis at all are almost sure to have this one. Occasionally it is offered for sale in southern farmers' market bulletins. Although *A. striata* is not striking in appearance, it is the first to bloom each year and in combination with some species produces attractive hybrids.

Absence of yellow-flowered cultivars among the Dutch and American hybrids makes *Amaryllis aglaiae* Castellanos, one of two species possessing yellow flowers, high on a list of desirable breeding stock. *A. vittata* var. *tweediana* (Herb.) belonging to the same subgenus as the two preceding species, has somewhat longer flowers which are free from the objectionable droop characteristic of this group.

It is believed that *Amaryllis leopoldii* T. Moore exerted the dominating influence on the large, regular, flat flowers of the modern Dutch hybrids. Unfortunately, this species has long been lost to cultivation and its natural range is unknown. In the same alliance there are other species which have left their mark on the garden sorts of today. *A. reginae* L. is one of them. This species is historically important in that it is one of the parents used to produce *A.* × *johnsonii* and countless later hybrids. It seems to transmit to its offspring a degree of tolerance to mosaic virus.

This alliance also contains species which bear little superficial resemblance to the Dutch and American hybrids. *Amaryllis evansiae* Traub & Nelson and *A. starkii* Nelson & Traub are among these. *A. evansiae* is small, ruffled, and graceful. Its cream to pale yellow flowers are a far cry from the large hybrids. *A. starkii* has extremely regular floral segments; its small, often solitary, upright flowers greatly resemble large rain-lilies.

In another subgenus are two species remarkably unlike in appearance: *Amaryllis pardina* Hook. *f.*, the spotted amaryllis with very regular floral segments, and *A. cybister* (Herb.) Traub & Uphof, the most irregularly shaped species in the entire genus. As a matter of fact *A. cybister* was at one time placed in the genus *Sprekelia*.

The last subgenus contains but two species, *Amaryllis reticulata* L'Herit. and *A. blumenavia* (C. Koch & Bouche ex Carr.) Traub. A variant of the first, *A. reticulata* var. *striatifolia* Herb., offers the breeders an opportunity to produce cultivars with variegated foliage — there is a white stripe along the channel of the leaf which is most attractive.

Amaryllis blumenavia is a true miniature, its scapes and blossoms being smaller than those of most daffodils. Per-

Left, Kell Hybrids (Amaryllis pardina × *A. cybister*). Center, Emery Hybrids (*A. belladonna* × *A. cybister*). Right, Hodges Hybrids (*A. evansiae* × *A. cybister*).

haps here is the answer to those who say amaryllis are too big.

Propagation of the species is easily accomplished by seedage. While it is true that within any given species there is some latitude of variation which shows up in its seedling populations, the characteristics which identify it remain quite constant. To a marked but somewhat lesser degree, the same holds true of first-generation hybrids between two species. Such hybrids are seldom identical, yet their resemblance to each other is sufficient to identify them as members of the group. Seedlings of advanced-generation hybrids, however, segregate in an endless series of variations. Thus for such hybrids propagation must be done vegetatively or by a long process of inbreeding to establish true breeding lines. In either instance, the process is slow and costly.

Because of the ease with which primary crosses between species can be made, it is hoped commercial bulb producers will avail themselves of species foundation stock and produce hybrids from them for the trade.

With this in view I have screened a number of primary-cross hybrids, and I believe the following which have been given grex or group names are worth introduction to the trade. All of them can be readily produced in quantity by anyone repeating the appropriate crosses.

The Senorita Hybrids were obtained by crossing *Amaryllis evansiae* with *A. striata*. Seemingly the best qualities of both parents are to be found in them. They are easy to grow, flower freely, and present a delightfully airy appearance which is not found in the modern, large hybrids. Their color varies somewhat. The basic ground color is cream to pale yellow and is overlaid with a blush of pink which may become more pronounced as the blossoms age. Their three- to four-inch flowers are often ruffled and vary somewhat in the width of their floral segments. The Senorita Hybrids have drawn more favorable comments than any amaryllis I have ever grown.

Although not a cross between two species, the Kerper Hybrids can be readily produced by seed. They are a cross between *Amaryllis vittata* var. *tweediana* and Ludwig's Strain of white Dutch hybrids. The latter parent is quite true breeding and probably resulted from years of meticulous inbreeding.

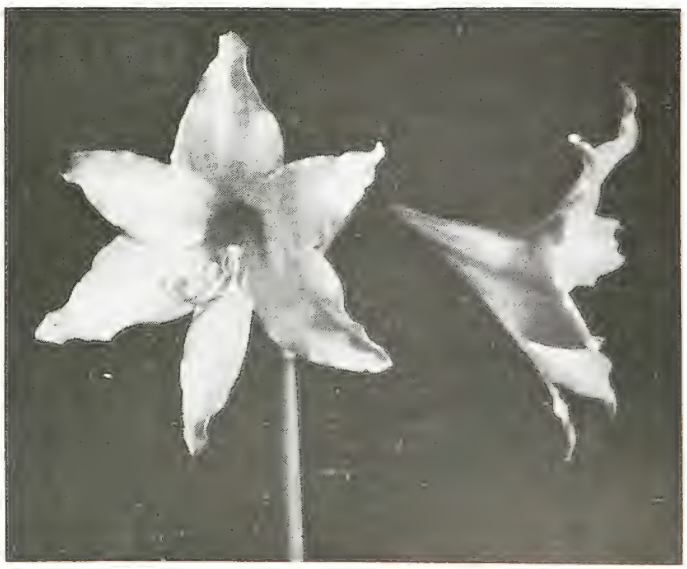
While the Kerper Hybrids are similar in type to the Dutch hybrids, they are exceptionally free-flowering and vigorous growers. Their huge flowers measure up to eight inches across, yet are completely free from the drooping posture so prevalent in many large-flowering hybrids. The white ground of the blossoms is accentuated by an edging of red on all segments and varying amounts of red flecking. Although the scapes may exceed twenty-four inches in height, they are strong and do not need staking.

Amaryllis hybrids involving *A. cybister* distinctly show kinship to this grotesque species. Three such hybrids, which may well be the vanguard of a new series of garden amaryllis, are deemed sufficiently desirable to name.

The Kell Hybrids, a cross between *Amaryllis cybister* and *A. pardina,* bring together the extremes of amaryllis flower-forms. The result is a startling open-faced flower with narrow, channeled segments which are gracefully recurved. The four-and-a-half to five-inch, cream-colored flowers are marked with crimson stripes extending outward from the base of the segments. This pattern is found on both sides of the segments. The inner surface is lightly stippled with minute, crimson dots.

The Emery Hybrids are a cross between *Amaryllis belladonna* L. and *A. cybister.* In both color and form they are

Davis Hybrids (*Amaryllis evansiae* × *A. aglaiae*).



reminiscent of *Sprekelia formosissima* (L.) Herb., the Aztec lily. Four red, four- to five-inch flowers, marked by a narrow, white star, are borne to each scape. The red style and filaments extend well beyond the twisted and tapered flower segments.

The third hybrid involving *Amaryllis cybister* has as its other parent *A. evansiae*. Its four-inch, pale yellow flowers form a graceful six-pointed star. The tapering, slightly recurved petals of the Hodges Hybrids are marked by a reddish star in the throat. Two to four flowers are well poised on ten- to sixteen-inch scapes.

The preceding three hybrids have received considerable favorable comment from people who do not grow any amaryllis. Many have remarked that they would make up well as corsage flowers.

Because there are no yellow-flowered modern hybrids, I could hardly wait to cross the two yellow-flowered species together. One of the most attractive hybrids has resulted from crossing *Amaryllis evansiae* with *A. aglaiae*. To my great surprise the progeny of this cross is quite varied in flower color, ranging from chartreuse to pale yellow to blush-pink. In many, the blush color develops or intensifies with the age of the blossom. The progeny of this cross, which have been named the Davis Hybrids, bear two to four, four- to five-inch flowers on eighteen-inch scapes. Although the flowers droop slightly, this fault is not serious.

The Kohlmeyer Hybrids are a cross between *Amaryllis pardina* and *A. striata*. Their scapes produce two to four orange flowers which measure four to five inches across. Although the parents of this cross have mottled or somewhat striated pigmentation, the Kohlmeyer Hybrids exhibit relatively smooth flower-color. Some individuals of this cross

Amaryllis vittata var. *tweediana*.

A pink-flowered close relative of *Amaryllis* × *johnsonii* (*A. reginae* × *A. vittata* var. *tweediana*).

are near white on the back side of the segments. All possess a small, greenish white star in the throat.

I thought it would be interesting to repeat the cross that produced *Amaryllis* × *johnsonii* over a hundred and fifty years ago. I could only approximate the cross, since I had to use *A. vittata* var. *tweediana,* instead of straight *A. vittata,* with *A. reginae*. The results produced both the expected and the unexpected. All of the progeny of this cross produced flowers which had the size and form of *A.* × *johnsonii* and all but a single seedling were colored red like *A.* × *johnsonii*. The one exception had the cleanest pink flowers I have seen in an amaryllis. While this clone has not been named, it is being used in further breeding experiments.

The species I have mentioned are a small but representative sampling of the fifty-five species recognized by Dr. Hamilton P. Traub. The hybrids described in this article scarcely represent a start toward exploiting the potential of this fascinating genus of plants.

Some species and hybrids of *Amaryllis* are obtainable from Grandview Nursery, Youngsville, Louisiana; University Hills Nursery, 470 Delgado Drive, Baton Rouge, Louisiana; Haphazard Plantation, Ferriday, Louisiana; and Robert Goedert, P.O. Box 6534, Jacksonville, Florida. Neither the Louisiana Society for Horticultural Research nor the University of Southwestern Louisiana sells plants; they release limited foundation stock to Louisiana nursery men who agree to propagate and sell to the public.

SPRING

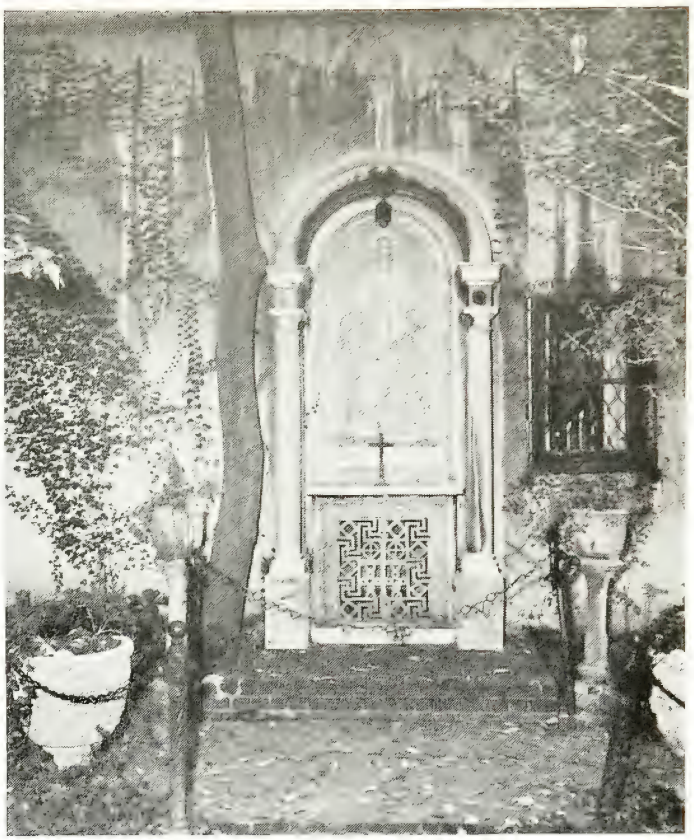
The year has changed his mantle cold
Of wind, of rain, of bitter air;
And he goes clad in cloth of gold,
Of laughing suns and season fair;
No bird or beast of wood or wold
But doth write song or cry, declare
The year lays down his mantle cold.
All founts, all rivers, seaward rolled,
The pleasant summer livery wear,
With silver studs on broidered vair;
The world puts off its raiment old,
The year lays down his mantle cold.

CHARLES D'ORLEANS, 1391-1465

CHURCH GARDENS

By ELEANOR GRIFFITH

Miss Griffith, a chemistry professor, taught at Rutgers The State University, New Brunswick, New Jersey, and Adelphi College, Long Island, New York. Since retirement, she has lectured for the Federated Garden Clubs of New York State, Inc., and for The Horticultural Society of New York on gardens in India and the South Pacific. Miss Griffith has always been interested in church gardens.



THERE ARE two things on earth which predispose a man to calmness and tranquility—a garden and a faith in God. Through the ages he has turned from one to the other. The Romans encouraged gardens among the people they subdued, feeling that the gardens exerted a calming influence. The followers of Zoroaster believed that any good gardener went to Heaven; in the Buddhist religion the garden went to Heaven as well. Japanese tea gardens with their ceremonial ritual were devised to wean men from the sordid facts of life by the contemplation of beauty. The Jews believed that Jehovah placed Adam in the Garden of Eden, this being the happiest life that could be given him by his Maker. In the Western World the barbarians went for their religious ceremonies to the sacred groves, where the quiet aisles of the great trees threw a hush on even their turbulent souls. Thus men throughout time have found no other place where life could be happier or more in touch with the eter-

Church garden and, above, outdoor altar of St. John's Church, Waverly Place, New York, New York.

Church garden and altar of St. John's Episcopal Church, Cold Spring Harbor, New York.

nal than in a garden.

Through the Middle Ages the only gardens were in the houses of religious orders. Even these had to be enclosed, for while the fear of God protected them from the faithful, it had no such restraint on the infidel invaders. Each monastery had many small gardens: a kitchen garden, a physic garden of herbs, an orchard garden, a small garden of flowers cultivated for the purpose of decorating the church altars; and its own place of meditation—the quiet cloister. The kings, the nobility, and the common men cleared their land only for agriculture, save for an occasional small plot of herbs kept by the lady of the castle for medicinal reasons. No period of peace lasted long enough to encourage further ventures in growing things until the fifteenth century. Then the Tudors in England and the Hapsburgs occupying most of the continent of Europe were able to stabilize their realms. This produced that security which encouraged men to build houses not surrounded by strong walls but by lawns and flowers. It is no coincidence that peace has always been associated with a garden.

If through the years, then, gardens have been connected with churches and religion, why have they not been so used by the churches of America? The cemeteries surrounding most of the older churches are a rather pathetic substitute. Is this an outgrowth from the old Puritan tradition which held that gardens gave too much pleasure and should be kept separate from religion? Men's minds, the Puritans believed, should be occupied by the stern discipline of duty. Modern psychology has cast a skeptical eye on the advantages of this constant threat of hell and damnation. It is felt nowadays that quietness and tranquility of mind lead far more surely to a healthy mental and moral personality. Indeed in our present crowded life, there is a definite need for a place of withdrawal. This is evident when one sees a busy banker or broker loitering in the churchyard of St. Paul's or Trinity to get away, if only for a little while, from the exciting market place. Catholic churches have always known and allowed for this; their doors are open, and there is a constant coming and going before their altars. Protestants only recently have opened their doors on week days. There, however, the old tradition of a church as a spot where man must gird his soul in strife for the right, taints the pews with effort rather than release. Would not a chapel garden, a quiet place among green and growing things, where overburdened housewives or harassed business men could sit for a little while and listen to birds singing, fill a great psychological need which is in the world today?

There are objections which, of course, I can hear. There is no room to build such a garden, nor money to install its plants; and even if there were, who is going to take care of it? Certainly not the average sexton; and the church auxiliaries have all they can do to keep their commitments. Just what kind of space is necessary? The space it would take to park a few cars would be enough. It must be large enough for a small altar and for a seat or two; it must be enclosed for privacy; and it must have an exposure to light so that the plants can grow. All country churches have this amount of room and even most of those in the city.

If the garden is small, it will not take many plants, and their initial expense, plus that for an altar and a bench or two, would not be very great. The enclosure can consist of a wall, or perhaps two walls of the church itself. The remaining walls can be of brick or wood, or even the trees and shrubs used in making the garden. If the church garden is in the city, this green screen must be thick enough to control the movements of animals and children, and to reduce the transmission of air-borne sound.

As for the upkeep, there are many plants which require little if any attention. Flowers which need spraying and staking, beds which need continual weeding are unnecessary. The emphasis here is not on a garden as an achievement of horticulture, but rather as a background holding an atmosphere of repose.

Grass, of course, is desirable if its maintenance presents no problem, but it is wise not to attempt a fine bowling green; a mixture of bluegrass, bentgrass, and fescue, with a nurse crop of clover, will adapt to sun and shade. Groundcovers which need minimal care can substitute, if grass is hard to grow and cut. The most costly outlay is hard paving, although it requires the least maintenance. It does absorb heat and create glare which can be overcome, to some extent, by making squares of concrete or brick and separating them with good soil into which thyme, ajuga, the purple-leaf wintercreeper, and other plants are inserted. Once well established, thyme grows so thickly that grass will not root—and thyme may be tread on with impunity. Near the border where the shrubs are set, a transitional zone of tight mat-forming material, such as dichrondra or lippia, may eliminate the need for edging. Under the shrubs away from traffic, English ivy, lily-of-the-valley, rock soapwort, and pachysandra may furnish a green carpet which needs very little care, English ivy can also be grown on the walls to give a green background. However, it establishes very slowly. Akebia, Japanese and Henry honeysuckle, and Virginia creeper are faster and need no more attention.

If color and flowers are wanted, a flowering tree or shrub is the least trouble and the most satisfactory. The color does not have to be flower-color; foliage and structure have a considerable range of color. These are predicated by the climate, the clearer colors being produced by the more humid zones. In an arid climate shrubs tend toward the gray-green or brown shades. The odors of box or bayberry can substitute favorably for church incense. If care is taken

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HOW CAN WE GROW TREE FRUIT VARIETIES AS SMALL TREES?

By KARL D. BRASE

Dr. Brase is Associate Professor, Department of Pomology, Cornell University, at the New York Agricultural Experiment Station, Geneva, New York.

ONE OF THE ACTIVITIES in the fruit-growing research program at the New York Agricultural Experiment Station is the selection and testing of fruit tree rootstocks.

Varieties of apple, pear, cherry, peach, and plum originate from seed but cannot be multiplied by planting seed, if the typical characteristics of a specific fruit variety are to be maintained. Methods other than reproduction from seed become necessary. Grafting a single bud, or sometimes also a short shoot containing several buds, to a closely related plant called the rootstock is the propagation practice. The fruit tree we plant then is composed of two parts—the fruit-bearing variety and the rootstock, the latter being the independent partner in the arrangement. If the varietal top were killed, the rootstock would still be capable of regenerating vegetative shoots and would stay alive. If the rootstock were killed, the varietal top would necessarily also die. Since the metabolism of rootstock and fruit-bearing top is retained and adjusted to the specific needs of each partner, it is important that the rootstock used for a given fruit is closely related, that is, apple to apple, cherry to cherry, and so on.

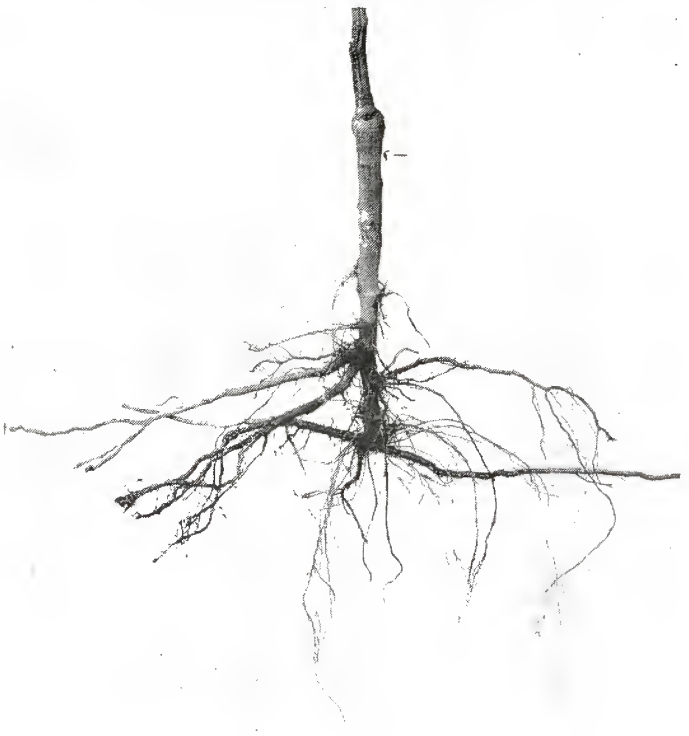
Rooted shoots on a young MM 106 "mother plant" at the time of removal of the shoots in early spring. These shoots serve as rootstocks. New shoots will grow and, when hilled up with a rooting medium such as soil, peat moss, or sawdust in late May or early June, will form roots and rootstocks to be used the following spring.

Rootstocks for propagating tree fruit varieties are of two different types: namely, seedling and clonal rootstocks. Seedling rootstocks, as the term implies, are grown from seed. If we use the apple as an example, we find that the seedlings, even if grown from the seed of a single tree, differ from the parent tree as well as from each other because pollen of some other apple variety was necessary to fertilize the stigmas which produced the seed. When seedlings are used as rootstock, we cannot predict very closely the growth and fruiting performance of the variety to be grown. Since, however, only such seedlings as have reached sufficient size during their first growing season are used, a natural selection of seedlings outstanding for vigor takes place; and pome fruits such as apple and pear, when growing on seedling rootstocks, give trees which under proper cultural conditions reach large size.

Clonal rootstocks are the vegetative offsprings of selected single seedlings called "mother" plants. Because of vegetative propagation — growing the rootstocks from cuttings or hilling up with soil the new shoots produced by the "mother" plants — we can obtain rootstocks of a selected clone which are all alike and therefore act uniformly upon the variety that was grafted to rootstocks of that clone.

The apple has given us more clonal rootstocks, now identified by letters and numbers rather than by name, than any of the other tree fruits. We can choose clonal apple root-

A typical root system of a young apple tree on EM IX rootstock. The tree, when replanted, should be in the ground to the point indicated by the arrow.



stocks which range in tree-size control from a very large to a very small tree.

If we wish to plant an apple tree which is only one-quarter the size of the same variety on a seedling rootstock growing under very similar conditions, we choose the variety on the clonal rootstock EM IX; this designation is derived from the East Malling Research Station in England, at which some dwarfing rootstocks have been developed. If we wish to have trees of approximately one-half the size of those on seedling rootstocks, we choose varieties on the clonal rootstocks EM VII and MM 106. These three clonal apple rootstocks not only restrict the vegetative growth of the variety, but also induce the variety to develop flower buds at a younger age and to bear fruit sooner than the same variety growing on a seedling rootstock. But there are disadvantages; the apple rootstock EM IX requires a deep fertile soil and has very brittle roots which break easily when the young tree is swayed by wind. Correct planting and a wind-protected location can be very helpful in preventing root breakage, particularly on young trees. The nursery-grown tree should have about a sixteen inch-long portion of rootstock so that it can be planted deeper than it was in the nursery; however, the graft-union between variety and rootstock must remain above ground. If placed below ground, roots might develop from the varietal trunk; and if this occurred, the growth-restricting influence of the rootstock would be lost and the tree would behave much like a tree growing on a seedling rootstock. Where the deeper planting is not possible, other support, such as a stake, must be provided for the newly planted tree. While there are numerous clonal apple rootstocks, the number of those with strong growth-restricting or dwarfing tendencies is limited. Those mentioned are the desirable ones.

McIntosh EM IX five years after planting.

Quite different is the situation with other tree fruits. For pear varieties we do not have a size-controlling rootstock of the same genus, *Pyrus*; but we make use of a certain quince clone, the Angers quince type A, belonging to the genus *Cydonia.* Not all pear varieties, however, grow equally well on the quince rootstock. Varieties which either fail or unite poorly are, among others, 'Bartlett' and 'Bosc'; 'Comice', 'Duchess of Angouleme', 'Hardy', and 'Packham's Triumph' unite and make strong graft-unions. But even 'Bartlett' and 'Bosc' can be grown on the quince rootstock, if a variety such as 'Hardy' is interposed between the quince rootstock and the 'Bartlett' fruit-bearing top.

None of the common rootstocks used in the propagation of stone fruit varieties have marked tree-size or dwarfing

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Apple trees on EM IX dwarfing rootstocks at blooming time. The trees are starting their fourth growing season.

CONVERSATIONS ON ECOLOGY X

Dr. Richard H. Goodwin is professor of Botany at Connecticut College, New London, Connecticut. A graduate of Harvard (where he also pursued his doctoral work), he did his earlier research as a fellow of the Atkins Institute of the Arnold Arboretum (in Cuba) and of the American-Scandinavian Foundation (in Copenhagen). His work on cytogenetics, on the effects of light on plants, on hormone regulation, on fluorescent substances, and on other phases of plant physiology has always been carried out against an ecological backdrop. In fact, as director of the *Connecticut Arboretum* since 1944 and as a founding member of the *Nature Conservancy* (of America), he has been one of the most alert and influential of all U. S. botanists in matters of preservation and wise utilization of natural resources.

CONNECTICUT COLLEGE
New London, Connecticut
Department of Botany

March 9, 1964

Dr. Pierre Dansereau
The New York Botanical Garden

Dear Pierre:

I am honored to be invited to join your provocative Conversations on Ecology, and I shall try to respond in the same vein as the other participants of this relaxed and extended discussion. My office at Connecticut College consists of a glassed-in porch on the north side of our biology building. It is called the goldfish bowl. Thus I am accustomed to having my professional activities exposed to the public view. At least they are there if anybody cares to look, just as are these thoughts which we lay out on paper. As a botanist I shall anticipate a friendly audience in *The Garden Journal.*

The trouble with scientific communication is, as Frank Egler has so clearly pointed out, that we chiefly talk to ourselves and our friends. When our words and actions come in conflict with the interests of others, we should be prepared to take abuse. Our motives are suspect; our integrity is questioned; we become "controversial" characters. To many of us in the profession this is highly distasteful.

It is most instructive to analyze the restraints which induce men to "sin by silence" in our free society. I am reminded of the recent case of a colleague at a state university who was told by his president to shut up or get out, after he had sounded a warning at a public meeting of the dangers to the community of the dropping water table. Presumably this idea was thought to be inimical to local business interests! Far better to overexpand and create a real resource crisis than to oppose progress! The vested financial interest reaches its tentacles into every nook and cranny of our society and makes its presence felt in innumerable ways, most of them more subtle than the case just cited.

Students, of course, are a very special audience and the nature of our relationship to them as educators imposes upon us special obligations and duties. For instance, in the introductory biology course to what extent should we deal with pure science and to what extent the applied? Can we count on students becoming informed of the socio-economic forces at play in our society, especially as they relate to the application of science to human welfare? Is it disloyal to our profession to discuss the nature of these forces operative upon us as well as of the natural ones with which we deal under the heading of pure science? Far too frequently policies in resource management are not guided by sound scientific principles—not because of any lack of scientific knowledge, but because of a failure on the part of the public to understand the persuasive power of vested interests operating to the detriment of their own.

To change the subject, an area crying for social action and until recently receiving inadequate attention has been the preservation of the resource base on which to carry on various kinds of biological teaching and research, the biotic community. The lack of concern for this matter on the part of our scientific colleagues amazes me. For a number of years now I have, through The Nature Conservancy, become involved in the promotion of a national program for the preservation of remnants of all types of undisturbed natural habitats for scientific, educational, and aesthetic purposes. The inadequacies of this program to date have been documented in a report on "Natural Areas as Research Facilities," recently prepared by a study committee set up by the American Association for the Advancement of Science under the chairmanship of Dr. F. Raymond Fosberg. Few indeed of the natural biotic communities in our country are adequately preserved on a permanent basis. The urgency of this problem was most evident to me on two recent transcontinental flights. Clear weather permitted observation of the evidence of man's heavy hand upon the face of the land. Dredged and filled-in marshlands, spreading suburbia, grading for highways, swaths cut for powerlines through the forests, valleys filled with artificial lakes—one or more of these activities were almost continuously in view. Once over the Appalachians, the country lies divided into quarter sections until the Rockies rise to break the geometry of the agricultural pattern. Beyond these, the great basin country sweeps away in arid reds and browns, but even here sharp lines reveal the barbed-wire boundaries between overgrazed and protected ranges.

Whenever one discusses natural areas with people, one always encounters the question of their definition. As a start one can define them as tracts of land on which the forces of nature are allowed to operate with minimum interference by man. And yet in almost every natural area one is confronted with management problems and with disturbances which are generated outside the geographical boundaries of the preserve.

For instance, a fenced-in fragment of midwestern prairie can no longer have the precolonial influences of fire and grazing. In order to maintain such a community a deliberate management program needs to be instituted, which may include planned burning and carefully controlled grazing by livestock. Neither of these procedures, however, is likely to duplicate the conditions produced by the activities of the Indian, the buffalo, and the antelope, to say nothing of the prairie dog, prairie chicken, wolf, and coyote. I have heard

it suggested that a preserve of at least one million acres might be required in order to reestablish a complete prairie community.

At the Connecticut Arboretum we have established two natural areas totaling over two hundred acres. There is still some "open space" on some of the adjacent land, but this is rapidly becoming completely residential. Recent observations document the presence of a wide diversity of mammals and birds inhabiting these areas, but the future of some of these populations may be in jeopardy for various reasons. Let me give a few examples. The size of the Arboretum may well be inadequate to support year-round the present population of deer, particularly in view of the abundance of dogs which get loose to roam the area. Certain species of birds may have their reproductive cycles upset by the predatory activities of jays and crows, the parasitic habit of cowbirds, and the occupation of hollow-tree nesting sites by starlings. All these species have been successfully adapting to suburban conditions and increasing in abundance in the vicinity. The bulk of our summer residents are migrants, which are dependent upon adequate habitat in the winter range and along the migratory routes for survival. At just what point may a cleared forest in South or Central America destroy the winter habitat of our red-eyed vireo or hooded warbler? Or when does a particular insecticide treatment for fire-ant control on a tract in Georgia or Alabama destroy our breeding woodcock?

Our botanical problems include the invasion of disturbed land by aggressive weeds such as the Japanese honeysuckle. Fortunately this species makes slow progress in the native forest. When once established on a piece of land, however, it forms a very dense community. We are studying how this species behaves under various circumstances, when once established, and also how it can be most effectively eradicated.

It has been my intention in this discussion to convey an idea of some of the fascinating ecological complexities of the natural area program. Some of these may appear frustrating to the conservationist, but they deal with realities confronting life on the changing face of the planet.

Dr. Edward S. Deevey, Jr., recently pointed out that if the human population continues to increase at its present explosive rate, there will soon be no room in the biological energy budget for such creatures as robins and earthworms. Let us hope that *Homo sapiens* will manage voluntarily to check his procreativity far short of this point on the population curve. The quality experiences in life depend upon the luxuries of diversity. Those of us devoting energy toward the natural areas program are admittedly attempting a holding operation looking toward the preservation of some of these "luxuries," which will become increasingly appreciated in proportion to their scarcity.

There are, of course, many desperately needed frontal approaches to the world population problem, among which is dispelling the persistent myth that there are no limits to the number of people who can inhabit the earth. Toward this end we devote an entire week in the introductory biology course at Connecticut College to readings in the general field of population and its broad biological implications.

Cordially,
DICK GOODWIN

BOTANICAL GARDEN STRESSES RESEARCH

By JOHN C. DEVLIN

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FOR MOST VISITORS, The New York Botanical Garden in the Bronx falls into a very neat and enchanting niche.

Here they find 232 acres of rolling woodlands and meadows graced with formal and informal gardens, indoors and out, orchids, roses, towering trees, mosses, and a small army of men armed with green thumbs.

But yesterday the Director, Dr. William Campbell Steere, a native of Michigan and a specialist in mosses and liverworts, disclosed that fifty-three per cent of the garden's yearly budget of $1.7 million was devoted to research.

He said that support for this work came from such diverse groups as the Army Corps of Engineers, the Atomic Energy Commission, the Office of Naval Research, the Arctic Institute of North America, the Edgewood Arsenal, the Damon Runyon Memorial Fund for Cancer, the National Institutes of Health, and the National Science Foundation.

Dr. Steere added that fifty grants covered much of the research. The Garden gets sixteen grants from the National Science Foundation alone.

The interests of the Armed Forces and various other national groups vary widely. The Atomic Energy Commission, for instance, is interested in learning all it can about the effects of radiation on plant cell growth.

A method of mapping vegetation, developed by Dr. Pierre Dansereau, Assistant Director specializing in botany, caught the eye of officers of the Corps of Engineers when it was described in the publication *Ecology*.

Without going into public detail, the corps asked him to adapt his system to military use. This will permit air-photo interpretation of plant zones for "trafficability [presumably for troop movements afoot or in vehicles], visibility, food and nuisance values of vegetations groupings."

The Office of Naval Research is interested in plant classifications for research. Navy oceanographers have returned from expeditions with hundreds of bottles of algae specimens to be classified.

So the Navy turned to Dr. David Rogers, Curator of Quantitative Taxonomy, and asked his assistance in establishing a method of reaching its determination with the aid of computers.

Dr. Steere, who likes to take an occasional whack at research when he can take time from his administrative duties, has collected mosses on expeditions supported by the Arctic Institute of North America. His wife, Dorothy, accompanies him on these expeditions.

Under two National Science Foundation grants, he is now continuing identification studies of polar plants.

The research done by the Botanical Garden, he said, is basic, not applied science.

The projects vary from the explorations of Dr. Bassett

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WILD FLOWERS - A NEGLECTED ELEMENT IN GARDEN DESIGN

By RENÉE DUPONT DONALDSON

Mrs. (John) Donaldson is a member of the Native Plant Garden Committee of The New York Botanical Garden.

OUR NATIVE wild flowers are having a hard time, what with chemical sprays, highways, suburban developments, and eager collectors whose collections promptly die. I am a crusader for preserving wild flowers, particularly the rare species. Botanical gardens should undertake the propagation of rare native plants indigenous to the garden's horticultural area. When these centers of horticultural "know-how" have produced a supply, I feel they should be planted in their exhibition gardens for design effect, along with cultivated plants. After all, what are cultivated plants? They are wild flowers from the rest of the world which have been studied and tamed for introduction into our home gardens. When the botanical gardens have produced an abundance of these native gems, the plants can be sold to nurseries for introduction into the home-garden market: I do not mean for planting along wild paths which are neglected but into our loved and nurtured gardens.

Spring-beauty, *Claytonia virginica*, still carpets "The Park" at Goodstay.

I came by my avocation naturally. My first impressions of wild flowers go back to childhood while tracking a hen turkey which had sneaked off to hide her nest in a young pine forest. Following this trail led me past wild flowers which are happy under pine trees, and it was here that I had my first view of the pink lady's-slipper, a never-to-be-forgotten thrill. This lovely terrestrial orchid, *Cypripedium acaule*, grows in many areas and at many altitudes. It is catholic in its taste for home sites but is most difficult to transplant or to cultivate.

My companion guide in these adventures was Dorothy, the daughter of the caretaker, who amused herself as a young Indian girl might have spent her days before the white man landed. Dorothy and I (ten years old) tracked and hunted most of every day, searching for soft-shell crabs with our bare toes in the shallow water of the cove at Cook's Point where the Choptank River empties into Chesapeake Bay. These hunting adventures took us through many plant colonies, so Dorothy and I began our love of nature's garden at this time.

My second conscious impression of wild flowers came a year or two later. My great-aunt's farm was on the outskirts of Wilmington, Delaware. I would drive my pony cart there to spend the day with a friend. We would picnic for lunch, sitting on the garden wall overlooking a small semiwild area called "The Park." We were amazed one spring to find our favorite spot covered with a carpet of pale pink and white flowers, spring-beauty. This photo, taken fifty-one years later at Goodstay, where my sister now lives, shares with you our youthful thrill.

"The Park" today has changed little. Tulip-poplar, oak,

and other trees are now mature—at the climax of their development; laurel, azalea, and other shrubs have grown until some of them are ten to twelve feet high. But spring-beauty *(Claytonia virginica)* still carpets the ground, to be followed by brandywine bluebells *(Mertensia virginica)*, Jack-in-the-pulpit *(Arisaema triphyllum)*, and dogtooth violet *(Erythronium canadensis)*. Many varieties of narcissi were planted and have gone wild: they are wonderful accents to the profusion of native plants: happy in a happy spot.

When I was fifteen, I cracked my hip. It was necessary to leave boarding school and stay at home wearing a metal harness. When spring came, the doctor permitted my being transferred to the country where Mother and Father had developed an informal country retreat on the site of an old grist mill. The dam of the original mill had been nearly washed away but had been replaced and improved, forming a lake about a quarter of a mile long. The millrace from the lake operated a large millwheel and spilled into a small stream which meandered down through a natural valley.

During this period a young friend, Patty, was persuaded to join me. We studied for some hours with a tutor, and the rest of the time we explored the lake and the feeder streams in an antique dugout canoe made by Indians. Soon we began to notice many varieties of native plants. This moved me to ask my mother for a spot in the valley for my own wild-flower garden: the site chosen was a small spring and its overflow. The canoe was a wonderful carrier for transplanting wild flowers — no vibrations to shake from the roots the soil with its many essential microscopic organisms. Of course, we had none of the modern aids — plastic bags, boxes, or wiltproof spray. With wet newspapers bundled around the roots, and also to shade the plants from the sun, our first transplanting efforts were surprisingly successful. Thus my first step was taken into what has proved to be a lifelong hobby—gardening with a special passion for our native plants and a crusade for their preservation.

After the first World War, when my ex-aviator husband and I settled down at Irvington-on-Hudson, New York, I began another wild garden, but this time I searched for an added element—design. To me it is important that gardens serve a purpose: make a picture from a door or window, form an outdoor room or a part of a living terrace, or invite the urge to stroll. Planting of flowers, shrubs, and trees should accent a view or complement a path leading to an exit or other focal point. Our new garden at Irvington was a stone footpath: its function a short cut which led to my husband's commuting station.

In 1933 we moved to Millbrook, New York, so my gardening was transplanted to a new area. Our home at the top of a valley called Deep Hollow is in the foothills of the Berkshire Mountains in Horticultural Zone #5. The countryside is rugged: rocky farm woodlots of mixed timber which, after many harvests, are returning to their natural climax growth—the hardwood forest.

Spending only weekends and summers at Deep Hollow Farm, I was content to have only a farm vegetable garden to supply our family of six. Riding horseback a great deal, I took to a western saddle, to the horror of my fox-hunting husband. This saddle is a marvelous contraption for the wild-flower gardener. To it I strapped two fishing creels,

Another scene at Goodstay, from a painting of "The Park."

filled them with trowels and newspapers (again it was before the days of plastic) and tied a small spade to the cantle. Instinctively I began to feel that a plant is nearly human and that in moving it one should choose for it a home similar to the one in which it had been thriving. All my life I have enjoyed happy, hardy plants: to me a plant which must be nursed and coddled is a misfit. This attitude led me to observe habitat. A plant's selection of its surroundings is very subtle and complex, involving soil (structure, moisture, chemical make-up), exposure (sun, shade, wind), symbiosis (friendly, complementary microorganisms and plants). Later I was to learn the term for this interdependence of plants with their surroundings—ecology.

In this new area my old passion was stimulated, and I began the development of a path leading to a small spring and on to a stream. Later, in 1940, our swimming pool became this path's focal point. Gradually another landscape design was added. Wild flowers were planted not only in a place where they might be happy but planted *to heighten the effect of their particular design.* Many plants are more attractive when one looks up at their pendant blossoms: for instance, Solomon's-seal *(Polygonatum commutatum).* Groundcovers and flowers which face upward are best where the eye falls naturally groundward, along steps or in locations where there is no competing feature or view. Thus I began to stage the outstanding features of each flower or plant.

By 1938, firmly established in Millbrook after the sale of our Irvington home, I began to long for some of the tamed plants and flowers of my old garden and became intrigued with the idea of combining these cultivated flowers with our native plants. I knew I wanted a more formal type of garden, wanted it as a setting from which to view our valley, but I felt that with no training I was beyond my depth and called on an old friend, Jack Crawford, a landscape architect, for advice and guidance.

Luckily when I began to consider designing this garden, Crawford had just returned from Europe where he had been fascinated by the terraced hillside gardens of Italy. We discussed the application of this basic form and he returned to Michigan to work out his ideas in a scale model. His problem was not simple, for our vegetable garden had been established just below the proposed site on an abandoned pasture sloping toward the stream. The exposure was excellent, facing southeast, and the drainage superb; but for this reason the septic tanks and the tile sewage field for house, stable, and tenant house had been constructed just to the side of our chosen site. The problem was how to have the new garden complement the simple beauty of our small valley, provide an approach to the existing vetgetable garden, and leave these important utilities untouched.

The following spring Jack Crawford presented his finished model. It provided two terraces on the contour, so oriented that the hills themselves became a frame and backdrop for the garden. No more satisfying solution could have been found, and the essential features of this design still remain after twenty years. Some years ago, after our children married and moved elsewhere, we decided to eliminate the vegetable garden and limit the area to the two terraces—the upper terrace for perennials and shrubs, the lower for herbs, lettuce, and horticultural experiments. In this garden I continued the technique of *featuring plant form and emphasizing design.* These fundamentals I believe I absorbed from my mother as we worked together in the Old Mill Garden of long ago.

Collecting plants and shrubs from native areas soon taught me a lesson. There is a great risk in collecting wild flowers unless one keeps in mind the necessity for providing them with an ecologically happy home. This is, of course, true for cultivated plants as well. I learned the hard way; lacking much-needed information and scientific data, I met with failures. Failures in transplanting bring disappointments, but far more important, the avid collector has a hand in the gradual extinction of the native flora of our land.

We gardeners must preserve this wonderful heritage. It would be a great step forward if our amateur and professional horticulturists, our garden centers, and our fine botanical gardens would undertake the *scientific* propagating and hybridizing of plants indigenous to their areas. Many botanical gardens have extensive libraries and large herbaria of dried native specimens, but dried specimens do not fill our gardens nor preserve our species; nor can they fill the void created by the burning, bulldozing, and now, chemical spraying of our native vegetation nor the raids of well-meaning but inexperienced collectors.

Over the years, many millions have been spent to finance botanical expeditions to collect rare wild flowers from other parts of the world, to hybridize and propagate them for the United States home-garden market. Why not those of our wonderfully rich native land? Such a program could produce a wealth of horticultural information and would be a source of happy, hardy plants. We amateur gardeners would do well to urge this program on a nation-wide scale.

This article merely touches on the way wild flowers may be used in designed gardens. A fuller exposition must await a book I hope to publish under the same title.

Jack-in-the-pulpit,
Arisaema triphyllum.

Trillium grandiflorum.

SOME WILD FLOWERS OF NEW YORK STATE

By Sibyl L. Golden

Mrs. (William T.) Golden, who is a member of The New York Botanical Garden, gave a lecture on this topic before the Tongere Garden Club, from which the following excerpts have been taken. A member also of The New York Zoological Society, the National Audubon Society, and the American Museum of Natural History, she is very much interested in conservation.

In the Olive Bridge-West Shokan area we are fortunate in having a remarkable cross-section of habitats and a variety of soil conditions. We have moist woods and dry woods, lush meadows and dry roadsides, open fields, white pine woods, oak-hickory woods, hemlock-maple and beech woods, and ordinary mixed woods where land, once farmed, is returning to forest. Plants tend to grow in natural communities. We would not expect to find brookside, swamp, bog, and pond plants growing in an upland meadow—the soil conditions, wind, humidity, and air would not be conducive to their growth.

We have a varied collection of native herbaceous plants. I have recognized more than one hundred and seventy species, among which are naturalized plants for they are an integral part of our landscape. This country would not have become great without its naturalized citizens who came from many foreign lands, and our native flora has likewise been enriched by the additions of the European and Asian plants which have made themselves at home—perhaps too much at home, for some are thought of as weeds.

What would a meadow be without daisies *(Chrysanthemum leucanthemum)* or the delicate, graceful flowers of Queen Anne's lace *(Daucus carota)*? We would be the poorer without the common and abundant orange day-lily *(Hemerocallis fulva)* blooming in summer. Since I've long since given up trying to make a perfect lawn, I welcome the cheery blossoms of the teeth-of-the-lion, *dents de lion,* or dandelion *(Taraxacum officinale),* the greens of which are prized for cooking in the South and from which some "old-timey" people still make dandelion wine. These are just a few of the plants from Europe which have become naturalized here.

With the exception of the jewels in our crown, mountain-laurel *(Kalmia latifolia)* and pinxter-flower *(Rhododendron nudiflorum)*, I shall not include flowering woody plants which delight the eye in spring—the wild cherries, the dogwood, the shadbush, and others. I shall deal principally with herbaceous specimens. Nor shall I allow myself to be sidetracked by the rocky ledges dappled with ferns, mosses, lichens, liverworts, fungi; nor by the club-mosses, the ancient fascinating lycopodiums, the living reminder of primeval times.

In early spring, when the snow of winter for the most part is gone, we shall find hepaticas *(Hepatica nobilis)* first and then the delicate, fairy-like bluets *(Houstonia caerulea)* in profusion. Later we shall find trilliums, white *(Trillium grandiflora),* red *(T. erectum),* and somewhat later the less dramatic, nodding wake-robin *(T. cernuum);* jack-in-the-pulpit *(Arisaema triphyllum),* spring-beauty *(Claytonia virginica),* Dutchman's-breeches *(Dicentra cucullaria)* and the exquisite, leathery-leaved trailing arbutus *(Epigaea repens)* with its charming aromatic, pink blossoms. Violets in lavender, purple, yellow, and white are happy in deep woods and open meadows, by rushing brooks, on lawns. At the same time, if we are fortunate, we shall come upon the wonderful yellow trout-lily *(Erythronium americanum),* sometimes called adder's-tongue.

Later, almost everywhere we look, apparently growing out of rocks, out of crotches in trees, as well as in the ground, the enchanting columbine *(Aquilegia canadensis),* with its pendant, red and yellow bells, will sway in every gentle breeze.

If we know where to seek them out, we are rewarded with the lady's-slippers, our native orchids. I have found *Cypripedium pubescens,* yellow, and, more frequently, the pink moccasin-flower *(C. acaule).* Yellow clintonia *(Clintonia borealis),* which I first encountered in the Great Smoky

Trailing arbutus, *Epigaea repens.*

Mountains of North Carolina, grows in our own Catskills.

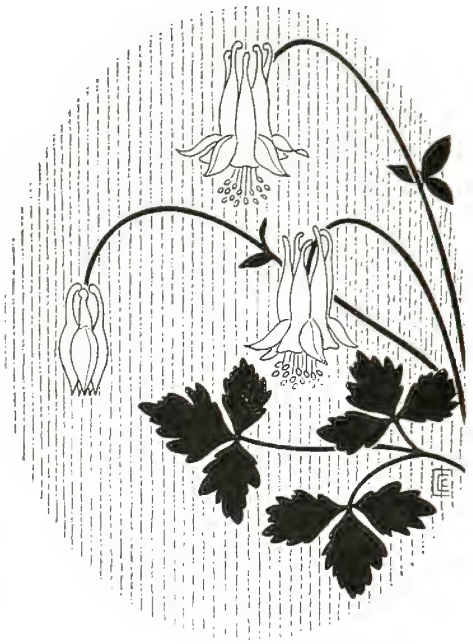
In late May (depending whether we have had a cold spring or not) the great plumes of false Solomon's-seal *(Smilacina racemosa)* are in contrast to the delicate, fragrant flowers of false lily-of-the-valley *(Maianthemum canadense)* carpeting the woods floor in some places. And then for color, there is the fringed milkwort *(Polygala paucifolia)* with its lovely pinkish purple flowers.

We'll find the anemones *(A. virginiana* and *A. canadensis),* the wood sorrels *(Oxalis acetosella* and *O. montana),* bunchberry *(Cornus canadensis),* shinleaf *(Pyrola elliptica),* star-flower *(Trientalis borealis),* and twinflower *(Linnaea borealis americana),* sometimes called deer wine.

If our walk had taken us to a pond, we would have found the marsh-marigold *(Caltha palustris)* going to seed and the impressive fronds of the broad-leaved cat-tail *(Typha latifolia)* growing in shallow water. In a marshy place we would have been rewarded with irises *(I. veriscolor* and *I. prismatica)* and buttercups *(Ranunculus)* in variety, for some like damp soil and some like meadows.

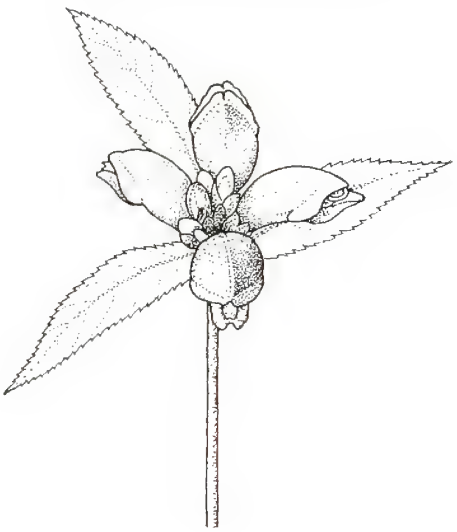
In a more open setting we shall find the bellworts—*Uvularia sessilifolia* with its creamy flowers and, less frequently, the large-flowered *U. grandiflora.* In the meadows we begin to see clumps of blue-eyed grass *(Sisyrinchium angustifolium);* when summer comes, its place will be taken by yellow star-grass *(Hypoxis hirsuta).*

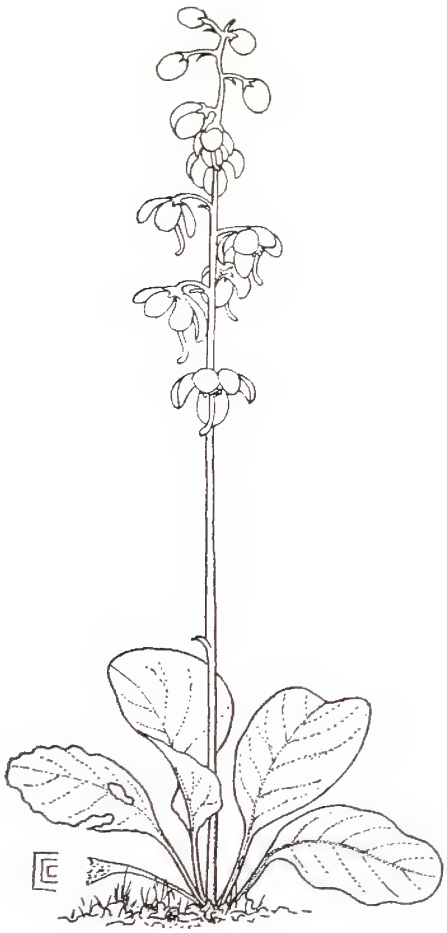
As May turns to June, we'll see bladder-campion or white ben *(Silene latifolia)* in profusion. In the open places we'll find lady's-thumb *(Polygonum persicaria),* common and rough cinquefoil *(Potentilla canadensis* and *P. recta).*



Common American columbine, *Aquilegia canadensis.*

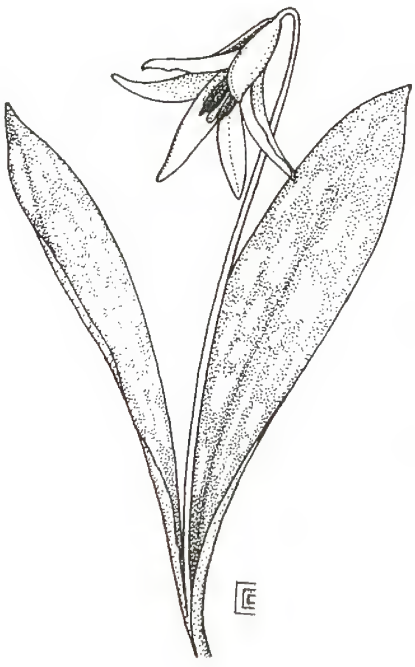
Turtle-head, *Chelone glabra.*





Left, shinleaf, *Pyrola elliptica.*

Below, trout-lily, *Erythronium americanum.*



Gentiana andrewsii.

We'll see barren-strawberry *(Waldsteinia fragarioides)* with its charming yellow flowers. The white flowers of American dewberry *(Rubus flagellaris)* give promise of delicious berries to follow. If there's water in the meadow, we'll see jewel weed or touch-me-not *Impatiens capensis (biflora)* and everywhere the pink flowers of wild geranium *(Geranium maculatum)*.

As spring turns into summer, there are fewer flowers in the woods. The oval, white berries, which have black centers and are borne on red stems, give *Actaea alba* its appropriate common name of doll's-eye baneberry. The berries are more distinguished than the feathery, white flowers. The bright red, durable berries of creeping wintergreen *(Gaultheria procumbens)* catch our eye; it is not unusual to find last year's berries along with those of the current year. The shiny, dark green leaves are evergreen. We may see bright yellow evening-primrose *(Oenothera biennis)*.

On the trail up High Point Mountain in summer is false foxglove *(Aureolaria glauca)*. On the same trail in spring, but flowering later than mountain-laurel, is sheep-laurel or lambkill *(Kalmia angustifolia)* and several species of huckleberry *(Gaylussacia)*.

In a damp place, lightly wooded, we'll find turtlehead *(Chelone glabra)*; in a more moist place, the leafy northern green orchis *(Habenaria hyperborea)*; and if it's really swampy, ragged orchis *(Habenaria lacera)*. In late August or early September we'll find the closed blue gentian *(Gentiana andrewsii)*. The brilliant cardinal-flower *(Lobelia cardinalis)* grows where it is wet. If the ground is slightly damp, white snakeroot *(Eupatorium rugosum)* will flourish.

For the most part summer wild flowers are flowers of the meadow: the pasture rose *(Rosa virginianus)*, purple-flowering raspberry or thimbleberry *(Rubus odoratus)*, meadowsweet and hardhack *(Spiraea latifolia* and *S. tomentosa)*, vetch *(Vicia americana)* with its handsome blue pealike flowers, common St.-John's-wort *(Hypericum perforatum)*, and viper's bugloss *(Echium vulgare)* with its pink and blue flowers brightening waste places.

In light woods we shall find white hellebore or Indian-poke *(Veratrum viride)*. There is a great stand of it on the trail up Slide Mountain. The loosestrifes are in evidence, whorled *(Lysimachia quadrifolia)*, fringed *(L. ciliatam)*,

Wood lily, *Lilium philadelphicum*.

Marsh-marigold, *Caltha palustris*.

and creeping *(L. nummularia)*. The last transplants easily and makes a fine groundcover, with its brilliant yellow flowers, for sun or shade.

My cutting garden becomes tangled with low and hedge bindweed *(Convolvulus spithamaeus* and *C. sepium)*, but the fact is I delight in their morning-gloryesque flowers and never have the heart to uproot them. This is also true of my losing battle with the fragrant, airy blossoms of *Clematis virginiana*.

Feel the hot stillness of the day! No wind to stir the black-eyed Susans or their kin, the cone flowers *(Rudbeckia hirta* and *R. laciniata)*. Both are sturdy and less graceful than the sunflowers *(Helianthus divaricatus* and *H. strumosus)*. I admire the brilliant color of the orange hawkweed *(Hieracium aurantiacum)* and tend to ignore the yellow forms *(H. florentinum* and *H. scabrum)*. How many summer wild flowers are yellow!

What else can we find in the open fields? Milfoil or common yarrow *(Achillea millefolium)* along with miscellaneous clovers *(Trifolium)*, mustards *(Cruciferae)*, the nuisance mulleins *(Verbascum)*, butter-and-eggs *(Linaria vulgaris)*, and swamp-thistle *(Cirsium muticum)*.

To counteract the stiff aspect of these flowers are the lovely wood and Canada lilies *(Lilium philadelphicum* and *L. canadense)* in light, open woods. In a sunny part are sundry milkweeds: butterfly-weed *(Asclepias tuberosa)* of startling orange; swamp milkweed *(A. incarnata)*, pink-purple; four-leaved milkweed *(A. quadrifolia)* — my favorite because of its fragrance and delicate white flowers; and common milkweed *(A. syriaca)*, dull lavender. All but *A. tuberosa* have a milky juice in their stems. We may find Oswego tea or beebalm *(Monarda didyma)*, whose red blossoms attract hummingbirds, and wild bergamot *(M. fistulosa)*, its pale pink-lavender relative.

If we persist we shall find the bluebell or harebell *(Campanula rotundiflora)* and creeping bellflower *(C. rapunculoides)*. The air is fragrant with honeysuckle. Bush-honeysuckle with its inconspicuous yellow flowers *(Diervilla lonicera)* is common, trumpet- or coral-honeysuckle *(Lonicera sempervirens)*, with red-orange flowers, is more difficult

(Continued on page 107)

To Introduce to you

THE NATIVE PLANT GARDEN
at THE NEW YORK BOTANICAL GARDEN

A MESSAGE

From William Campbell Steere

Dr. Steere is Director of The New York Botanical Garden.

As the bulldozer ruthlessly clears the way for housing projects, shopping centers, and throughways, it not only roots out and destroys the native plants in its path—it also creates environmental conditions in a much wider area which are less favorable and even fatal for wild beings in general. Although the inroads of this "American way of life" are accepted as inevitable by too large a majority of people, those of us who are conservation-minded must be deeply concerned over the ever increasing rate of disappearance of one of our great natural resources, our native wild plants. Every year which passes brings some handsome wild flower closer to extinction, in direct proportion to the increase in population and the resulting growth of urban areas. Fortunately, this growing emergency has been recognized, and forward-looking and philanthropic citizens and conservation-oriented organizations have taken steps to remedy it.

The New York Botanical Garden has concerned itself with preservation of the native flora, as well as its elucidation through handbooks and manuals, since the turn of the present century. In 1902, Mrs. Elizabeth G. Britton, wife of the first director of the Garden, was one of the prime movers in organizing the Wild Flower Preservation Society of America (succeeded in 1933 by The Wild Flower Preservation Society, Inc.).

Thanks to the wisdom and foresight of pioneers in the field of conservation of native plants a half-century ago, an undisturbed area within The New York Botanical Garden was set aside for a native plant garden, and later fenced. The almost miraculous existence of this protected area with a variety of habitats, in the midst of a densely populated section of New York City, provides an excellent site for the establishment of a Native Plant Garden.

We stress again The New York Botanical Garden's strong and historic interest in the Native Plant Garden, as well as its commitment to it today, even though its development has been delayed for lack of funds. In 1901, the Misses Olivia and Caroline Phelps Stokes of New York presented to The New York Botanical Garden a fund of $3,000, on condition that the interest thereon "should always be used for the investigation and preservation of native plants or for bringing the need of such preservation of native plants before the public." In spite of the prophetic vision and worthy cause of the donors of the Stokes Fund, the income from this fund does not go very far, especially today.

Under the leadership of Mrs. John Donaldson, Mrs. Percy Douglas, and other responsible citizens, a Committee on the Native Plant Garden has been formed. The Committee plans to raise an endowment fund of $375,000, the income from which will support and maintain the Native Plant Garden in perpetuity, and will permit effective programs of teaching and research on native plants.

In *This is the American Earth,* Nancy Newhall gives a thoughtful and moving definition of conservation as "humanity fighting for the future." Please join this fight and help us bring back to New York City, for all to see, native plants which have disappeared completely from this great urban area, plants which are excessively rare and on the verge of extinction, and commoner native plants which everyone should know.

A MESSAGE

From John Kieran

Mr. Kiernan a naturalist, former newspaper columnist, contributor to many magazines on natural history and philology, author of books on sports and nature subjects, is now living in Rockport, Massachusetts.

As a child in the Bronx I was enchanted with the native wild flowers of the region and I have never recovered from the infatuation. Any garden is delightful, but a wild flower garden has a special appeal for me. It is a collection of gems which otherwise I might have to travel far to see. Like every other child in our neighborhood, which was then truly rural, I began by adoring the dandelions and blue violets which we gathered in the fields to take to school for what was then celebrated as "Arbor Day." In memory I can still see the teacher's desk banked with the contrasting colors of the child offerings. I suspect that white daisies and black-eyed Susans came next in my youthful affections, but there has to be room in that early group for Dutchman's-breeches. Not only was I vastly amused by the shape of the dainty little flowers, but the fernlike foliage was beautiful in itself.

Each year I added something to my knowledge of—and love for — the wild flowers of my home territory. I can't honestly say that I preferred picking daisies to playing baseball or that I neglected football practice to gather goldenrod. Somehow I found time for all such pleasant occupations.

Just when I began to think that I had at least a nodding acquaintance with most of the attractive flowers of the region, I came a dreadful cropper and my ignorance of botany was laid bare. I was telling a friendly bus driver that we had three species of violets within a mile or two of our house—blue violets, white violets, and yellow violets. It turned out that the bus driver was an amateur botanist in his off hours. He told me that he thought he could find thirty species of violets in the general area, and he went on to mention orchids he had encountered on his local trips.

Orchids! Up to that time I thought orchids were to be found in two places—jungles and expensive flower shops. Then I discovered that a white daisy wasn't a single flower with petals which told me whether I was loved or not, but a whole colony of flowers of two kinds, my "petals" being ray flowers and my yellow center disc flowers. As for local orchids in the wild, he revealed to me that pink lady's-slipper, still to be found in the wooded patches of the Bronx, was an orchid and so was the scarcer yellow lady's-slipper which hid deeper in wet ground. He knew bogs in Westchester where he could find the rose pogonia, arethusa, and calopogon—orchids all—and other native members of the famous family.

Evidently I needed two things to widen my knowledge of native wild flowers—a botanical guide and a magnifying glass. I acquired both very quickly and went to work, if you wish to call it that. It has been a wonderful and rewarding fifty-year venture for me.

THE NATIVE PLANT GARDEN

By T. H. EVERETT

Mr. Everett is Assistant Director (Horticulture) and Curator of Education of The New York Botanical Garden.

THE FIRST MAJOR PLANTING in the Native Plant Garden will be installed this spring. In preparation for this a tremendous amount of work basic to providing favorable environments for a large number of species has been accomplished. Little of this effort shows directly, yet it is more important than the actual setting of the plants because unless environments are agreeable, plants will not flourish.

We are not attempting to preserve a natural area already well furnished with natives, nor do we intend to limit our plantings to kinds which easily naturalize themselves. We are developing a garden in which will be cultivated as large and representative a collection as possible of those plants that occur spontaneously in eastern North America. In a comparatively small area we expect to grow many more species than could possibly be found in any natural or naturalized area of comparable size.

I emphasize that this is a *garden* and that its establishment and maintenance calls for the best gardening practices. All gardening depends for its success upon favorable modifications of environments and the elimination of competition. Once weed plants are destroyed and their successors are prevented from gaining footholds, and once agreeable conditions of soil, water, atmospheric humidity, light, and temperature are assured, the main obstacles to growing plants are conquered.

The site of our Native Plant Garden includes woodland and meadow areas together with a stream and small bog. This spring our effort is limited to the wooded portion, a beautiful tract, interesting topographically and containing charming rock outcrops and good trees as well as deciduous shrub undergrowth and some rhododendrons. A simple circulatory path system margined by low rustic guide rails provides easy access for visitors.

I emphasized that this is to be a garden, and so it will be as far as the techniques of cultivating its flora are concerned, but pictorially, as a landscape, it will be naturalistic. We expect to develop that finest type of wild garden, the one in which the true artist so successfully conceals his art that the *effect* is that of complete naturalness.

To prepare for the plants to be set out, we have cleared the ground of weeds and removed unwanted trees and shrubs; we have enriched the soil to a full spade's depth by incorporating through it vast quantities of organic matter—compost, leafmold, humus, and peat moss—and by mixing these in until the upper layer, which was largely compacted, dead, inert, and lacking in organic matter, is loose, spongy, humusy, and fit to nourish our plants. A system of water lines and outlets for irrigating has been installed and, most helpful, overhead misters, which make it practicable to bathe the area, atmosphere, plants, and soil in a mountain mist of moisture which cools, humidifies, and cleanses the air. This provision for mitigating heat and aridity by "fogging" the area on summer nights will make it possible to cultivate many natives which otherwise could not be expected to flourish under city conditions.

A prodigious amount of work has been accomplished; at the time of writing much has yet to be done. Many thousands of plants are to be planted this spring, a few thousand more in the fall. After planting will come mulching, watering, weed control, and other horticultural operations. Labeling and other means of interpretation must be adequate. Keeping records of plant performance is important. Of tremendous significance will be the development of a broad educational program based on this new facility, perhaps including guide service, publication of pamphlets, lectures, and courses of instruction. Research on propagation and other problems concerned with native plants may receive attention.

This Native Plant Garden does not stand alone. It is established as an integral part of a great botanical garden and will draw strength from the human resources of its staff's knowledge as well as from the physical resources of a great library, herbarium, and other living plant collections. It will serve a large and ever increasing public which will have access to it throughout most of the year under such minimal restrictions as are essential for its protection.

The abilities and skills of all connected with the project will be tested to the uttermost, but all privileged to play a part in establishing this Native Plant Garden are working as a well-integrated team and they surely cannot fail.

A topdressing is being spread over the woodsy soil.

Gardeners are laying plastic tile for drainage.

A MESSAGE

From The Committee of the Native Plant Garden

How recently have you, like young John Kieran, come upon a lady's-slipper, spied the brilliant red of a clump of cardinal-flower, or marveled at the delicate surprise of a trailing arbutus? These are only three of the fast disappearing wild flowers of our northeastern fields and woodlands.

They are being destroyed by the onward march of Suburbia; they survive today only in shrinking wildlands or in sanctuaries created to preserve them. Most of these are in the countryside, inaccessible to city children and their parents. There is so little chance for New Yorkers to see, to know, and to enjoy this fresh and natural beauty that we have undertaken to create a Native Plant Garden near the heart of asphalt and concrete in New York City.

In the Native Plant Garden, visitors will learn about the thousands of common, as well as rare native plants which until recently grew freely in our countryside. Flowers, shrubs, and trees are being planted and cared for in a charming, enclosed area of woodland, meadow, and stream. They are being scientifically identified so that the earnest student as well as the casual stroller may gain accurate knowledge of what he sees. This "plant library" will be a great resource for teaching, and the student at The New York Botanical Garden will be offered courses to satisfy his own special curiosity.

All this takes money. We have begun initial planting with a most generous gift from Mrs. John W. Donaldson. Other gifts have followed, so that our endowment fund now totals $100,000. To maintain and add to the planting, to staff the teaching program, and to do the necessary research to make this a learned as well as a delightful haven, we need an additional $275,000. This sum will maintain the garden in perpetuity.

Your contribution will be a gift not only to the Native Plant Garden and to plant lovers everywhere—it will be a gift to the people of the City of New York.

Committee of the Native Plant Garden

Officers: Chairman, Mrs. Percy L. Douglas; Vice Chairman, Mrs. John E. Lockwood; Vice Chairman, Mrs. Mary C. Rockefeller; Treasurer, Mrs. Randolph C. Harrison; Assistant Treasurer, Mrs. Edward C. Delafield; Secretary, Mrs. Thomas S. Gates, Jr.

Steering Committee: Mrs. Ferdinand Eberstadt, Mrs. Randolph C. Harrison, Mrs. Grayson Kirk, Dr. Samuel W. Lambert, Jr., Mrs. Madison Lewis, Mrs. Donald B. Straus.

Members: Mr. and Mrs. Charles Banks Belt, Mrs. Burnham Bowden, Mr. and Mrs. Charles Burlingham, Mrs. LeRoy Clark, Mrs. Leighton H. Coleman, Dr. and Mrs. H. S. Fenimore Cooper, Mrs. John T. Curtis, Mrs. Eli Whitney Debevoise, Mrs. John W. Donaldson, Mrs. Charles Doscher, Mrs. Nicholas du Pont, Mrs. Marcus Fair, Mrs. Francisco A. Gonzalez, Mrs. L. Whittington Gorham, Mrs. James L. Harrison, Mrs. Wallace K. Harrison, Mrs. Charles Hoffman, Mrs. William G. Housekeeper, Mrs. John N. Irwin II, Mrs. Samuel W. J. Lambert, Mr. Madison H. Lewis, Mrs. Hugh Littlejohn, Mrs. Augustus Paine, Mrs. Henry O. Pattison, Jr., Mr. and Mrs. Hermann G. Place, Mrs. John Poinier, Mrs. Henry S. Prescott, Mrs. Fergus Reid, Jr., Mrs. Herman D. Ruhm, Mrs. Alexander Saunders, Mrs. John C. Sluder, Mrs. Oakley Sheldon, Mrs. John L. Senior, Mrs. Julian K. Sprague, Mrs. William C. Steere, Mrs. I. N. Phelps Stokes, Mrs. Paul Sturtevant, Mrs. H. Clinch Tate, Mrs. Lucien Taylor, Mrs. James Todd, Mrs. Oliver A. Vietor, Mrs. Jerome P. Webster, Mrs. Earl K. Williams.

I am happy to contribute $..... to the Native Plant Garden of The New York Botanical Garden payable in full herewith.

I pledge $....., payable as follows .....

.....

I wish my contribution made ..... in memory of ..... on behalf of

.....

NAME .....

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Checks should be made payable to
The New York Botanical Garden Native Plant Garden
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MY FRIENDS, THE WILDINGS OF THE NEW YORK BOTANICAL GARDEN

By ARTHUR W. AMBLER

Mr. Ambler spends his leisure in photographing wild flowers, birds, and other animals which frequent the grounds of The New York Botanical Garden. He is a member of the Garden, also of The New York Zoological Society and of the National Audubon Society.

Part IV — Late Spring

"Hail, bounteous May, that doth inspire
Mirth, and youth, and warm desire;
Woods and groves are of thy dressing,
Hill and dale doth boast thy blessing,
Thus we salute thee with our early song,
And welcome thee, and wish thee long."—Milton

AT THE NEW YORK BOTANICAL GARDEN, a relatively small oasis in the vast City of New York, there is a concentration of nature subjects in late spring. Influenced by the balmy weather, warm sunshine, and showers, vegetation quickens. And the songs of many birds are heard, as they seek shelter among the fresh green leaves of trees and shrubs.

While walking along the bank of the Bronx River, my attention was attracted by a killdeer *(Charadrius vociferus)*. This bird has a wide distribution in the United States, but only occasionally visits the Garden, and then it does not remain long, preferring mud flats and beaches, but it does frequent pastures and especially plowed fields where it finds its favorite insects and earthworms. It is a large (nine to eleven inches) and noisy bird, as its scientific name implies, and like the blue jay makes the air resound with its cries.

The black-crowned night heron *(Nycticorax hoactli,* average length, twenty-four inches) is no stranger to the Garden. From March until late November it might be seen perching on the limb of a tree. In spite of its name, it is not necessarily nocturnal, but is also active during the day, especially toward evening or when the sky is overcast.

The eastern bluebird *(Sialia sialia),* whose average length is seven inches, is perhaps a better harbinger of spring than the robin, for fewer of its kind winter in the North. They arrive in this area the middle of March and stay until the middle of November. Only now and then is the eastern bluebird seen at The New York Botanical Garden; for the past several years it has been seen less and less frequently. Bird watchers now refer to it as a "rare common bird."

This gentle bird has long been eulogized in song and poem, but aside from our affection for it, its presence in a community is highly desirable for practical reasons. The eastern bluebird consumes enormous quantities of cutworms, caterpillars, cankerworms, weevils, beetles, and other insects. In autumn and winter it eats wild fruits, including the berries of holly and dogwood.

Another frequent visitor to the Garden is the diminutive ruby-throated hummingbird *(Archilochus colubris)*; its average length is three and three-quarter inches. It is the only species of hummingbird in the East and is usually seen from about the middle of May till the middle of September, sometimes earlier, sometimes later. Its diet is chiefly the nectar of flowers, and the myriad blooms in the Thompson Memorial Rock Garden are particularly attractive to it. I have also seen this hummingbird in the open woodlands and along the banks of the Bronx River, drinking nectar from thistles *(Cirsium arvense)* and jewelweed *(Impatiens biflora)*. Incidentally, the photograph of the ruby-throated hummingbird accompanying this article shows its elongated tongue extended beyond its elongated bill.

Perhaps because of their number, industry, and appetite for insects, wood warblers are ranked at the top of the list

Oven bird, *Seiurus aurocapillus.*

Ruby-throated hummingbird, *Archilochus colubris.*

Wild strawberry, *Fragaria virginiana.*

Common blue violet, *Viola papilionacea.*

as preservers of woodlands. A greater number of warblers is to be found in the eastern section of the United States than in the western section. They are small (five to six inches in length), brightly colored birds and, next to sparrows, comprise the largest family. Warblers winter in the South and summer in the North, arriving in this locality late in April and early May and returning to the South from the middle of September to early October. The only one likely to be seen in winter is the myrtle warbler *(Dendroica coronata,* five to six inches).

Among the warblers observed in the Garden are the black and white *(Mniotilta varia,* average length five inches) and the oven-bird *(Seiurus aurocapillus,* average length six and a quarter inches). The black and white warbler is readily identified by its black- and white-striped crown and similar markings on its body. This bird stays close to tree trunks and branches, scanning them for insects. The nature observer has to exercise care in identifying the black and white warbler, because the very common black-poll warbler *(Dendroica striata,* average length five and a half inches) has similar black- and white-striped markings; the latter bird, however,

(Continued on page 107)

Wild geranium, *Geranium maculatum.*

False Solomon's-seal, *Smilacina racemosa.*

Eastern bluebird, *Sialia sialia*.

Moccasin-flower or pink lady's-slipper, *Cypripedium acaule*.

Large-flowered trillium, *Trillium grandiflorum*.

THE WILD FLOWERS OF AMERICA

By DIARMUID C. RUSSELL

Mr. Russell, the Secretary of the National Committee for the Wild Flowers of the United States, is the son of AE, the Irish poet. Mr. Russell, who came to this country as a young man, started the firm of Russell and Volkening, Inc., some years ago; it enjoys a reputation as one of the finest literary agencies in the United States. Mr. Russell has long been interested in plants and has a "green thumb." He is also talented in painting, as was his father.

THE NEW YORK BOTANICAL GARDEN is now engaged in the preparation of a series of five volumes, covering all the wild flowers of the United States. They will be the definitive works for this country for amateur botanists. Each volume will be as complete as reasonably possible for the region covered, and every flower will be illustrated photographically in full color, wherever color is an important factor in identification.

This project, easy to summarize, arose seven years ago in the minds of a small group of wild-flower enthusiasts, all of whom at one time or another had been disappointed and sometimes maddened by the lack of complete and really authoritative works. No popular or non-technical work to date is anywhere near complete. The only complete works are technical floras which use little or no color, and their language is incomprehensible to any save a professional botanist. One region, the Northeast, is reasonably well covered by a number of books but even in these the use of color is limited. For those who are not professional botanists, the patch of color which catches the eye is most readily identified by an accurate color plate. Other regions of the United States are covered only in a very hit or miss fashion so that identification in these places often depends on finding a knowledgeable local expert.

Apart from this there was a feeling that some wild flowers might be facing extinction—*The New York Times* reported some years ago that the sego lily, the state flower of Utah, was dying out because of alterations in environment. Wild flowers are often very local, even if abundant, and the growth of population which brings along with it new housing developments, the extension of towns far into the country, new roads and factories, all suggested the time was ripe for some form of permanent record. In other aspects of nature there are already extinct species. It was hoped a definitive series of books would spread enough knowledge and arouse enough interest to make wild-flower preservation more likely.

Between an idea and its realization there is always a gap, and for this project it had to be determined whether it could be a viable operation for a publisher, able to be brought out at a reasonable price. It also had to be determined if a reputable botanical institute would think well enough of the project to give its time and expert skills to preparation of the material.

The New York Botanical Garden was approached and to the group's delight was enthusiastic. It felt the project would be of major importance in the fields of natural history and conservation and that while intended for the public it would also prove of great value—especially to non-taxonomic botanists. During the course of the project certain taxonomic questions would have to be answered. So one problem was out of the way. Then it was quickly apparent that a number of other questions were coming up. The number of color plates involved and their cost placed the project quite outside any normal publishing practices. Funds were going to have to be raised. The Garden itself could not be involved in this, being already committed to many fund-raising activities — but it promised, if the project became feasible, to undertake the complete work of preparing the text and securing the illustrations. This ensured the little band of enthusiasts that if their dream were realized, the volumes would have the prestige and authoritativeness only botanists could provide—a sure guarantee of the excellence everyone desired.

So much was to the good, but much was haze and uncertainty. There were no figures about anything — how many volumes there might have to be, how many species to be dealt with, how many line drawings needed, how many color photographs, how much text. Without exact figures no publisher could estimate if the books could be brought out at a reasonable price—and a reasonable price was essential to make possible the group's aims, for what was wanted was a permanent definitive record of American wild flowers, always available, not some limited edition which might go off the market quickly.

The inevitable next step followed. Exact information was needed, and a generous member of the group offered enough money to engage a professional botanist to look into these matters. Dr. Steere was consulted and secured a highly capable botanist from the West Coast, Mrs. Roxana Ferris, who spent two months in the Garden's Library and completed a report. The country fell naturally into five floristic regions, hence five volumes. A close approximation indicated about twelve hundred colored illustrations would be needed for each volume. Mrs. Ferris also gave estimates on the amount of text and the number of line drawings.

Publishers were then approached and the firm of McGraw Hill, which made careful estimates on the figures submitted, said the volumes could be done at a price of from $25 to $30, depending on variations from the figures submitted and costs at the time of publication, if the plates could be made and leased to them. The publishing firm itself would be responsible for the costs of paper and printing and binding and general supervision of these activities. On this basis they were prepared to enter into a contract with the Garden—and in fact did so. All was hypothetical at this point. To turn fancy into fact, money would be needed to make the plates for text and illustrations, and to meet the extra expenses of the staff for the Garden's share of the work. The total costs of these two items made the group stagger—they came to more than one million dollars!

At least one thing can be said for enthusiasts—they are enthusiastic. With abandon and optimism they set about forming a national committee for the purpose of raising

this large sum. It can be reported now and surprisingly that about three-quarters of this amount has been raised, sufficient to start the project in a handsome manner. This amount will not cover the full five volumes—more will be required. For the benefit of those who find the project appealing, the information is given that donations are tax deductible and should be made to the order of The New York Botanical Garden and specifically earmarked "Wild Flowers of the United States Fund."

It is impossible at this point to give enough thanks to Dr. Steere, the Director of the Garden, and to many other members of the staff—for their advice and help was needed continuously through the years—who now find that what was a gleam in the eye is a vast project to be supervised. Dr. Steere has luckily and artfully persuaded Dr. Harold William Rickett, already well known as a distinguished botanist and also as an expert in the wild-flower field, to become the operating head. So now Dr. Rickett is snugly tucked away in the Garden, busily occupied in the multitude of details which have to be taken care of. He is very ably assisted by Charles C. Johnson, photographer (whose pictures make the mouth water); by Rachel Speiser, illustrator, whose line drawings bring out details as no photographer can for plants which look alike; by June Wetherill Beasley, assistant botanist; and by Dorothy M. Langguth, secretary—who probably, like most secretaries, has to keep everything in mind.

Dr. Rickett has had to set up botanical groups in other parts of this country to aid in other volumes. There are taxonomic problems which will have to be solved. Thousands of words of exact but not ultra-scientific text have to be written, simple but precise keys to the various species have to be devised, the mechanism for procuring first-class color photographs and examining them has to be taken care of. In short, Dr. Rickett has a big job on his hands and is taking care of it in a way to make everyone delighted.

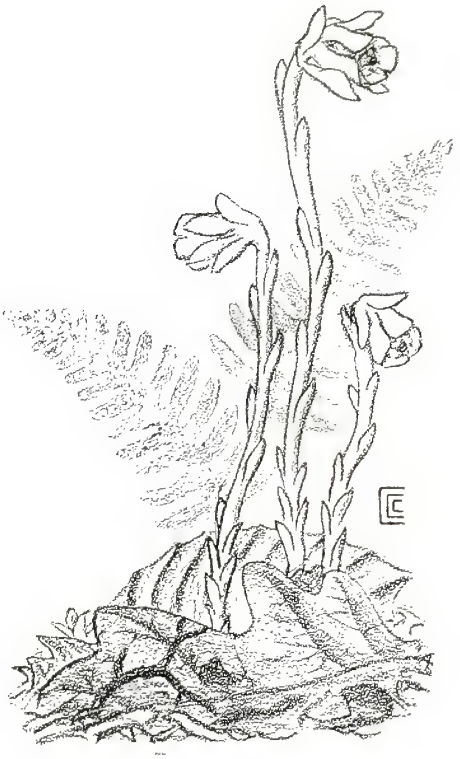
By the time this article appears, the text and illustrations for the first volume will be about ready, and Dr. Rickett will be well into the preparation of the second volume on the southeastern area. It seems impossible to believe this project, blessed as it has been by the approbation of the heads of most of the botanical institutions of this country, is at last under way. From any point of view it is a major botanical and publishing project. Its implications for nature education and conservation, and for arousing interest in botanical matters and institutions can hardly be guessed at now. And the United States will at last have a record of its wild flowers equaling, or surpassing, those which have been made for many European countries.

WILD FLOWERS OF NEW YORK (Continued from page 98)

to find. A small, sweet summer plant is Venus's looking-glass *(Specularia perfoliata)*; the leaves grow around the stem, and it has violet-blue flowers.

I'd like to mention two curiosities, Indian-pipe *(Monotropa uniflora)* and pine-saps *(M. hypopitys)* which grow in decayed and decaying organic matter. They are saprophytic herbs.

The late summer wild flowers paint a brilliant picture before they are eclipsed by the glory of autumnal leaves and



Indian-pipe, *Monotropa uniflora.*

few compare with goldenrods *(Solidago)*. There are about thirty species in New York State. Some have inconspicuous white flowers instead of yellow, but for brilliance and grace there is none to compare with the vivid plume of rock goldenrod *(Solidago canadensis)*. As if this were not enough, the asters complete summer in a surge of glory with the spectacular New England aster *(A. novae-angliae)* replete with flowers pink, blue, and purple.

WILDINGS AT THE GARDEN (Continued from page 104)

has a solid black cap and white cheeks.

The oven-bird, a common and widely distributed warbler, is easily observed because of its terrestrial habits. I have usually seen it walking, with tail bobbing, over leaves on the ground or along a log, stopping frequently to pick up an insect. This bird's name is derived from the curiously domed nest of grass, which it sets on leaf-covered ground usually in open woods.

Some of the early-blooming wild flowers, having performed their functions, now retire to make way for those which bloom in May in rapid succession. In the woodland is the false Solomon's-seal, sometimes called false spikenard *(Smilacina racemosa)*. This really beautiful native woodland plant is also interesting in September, when it carries its cluster of red berries. Within the woodland the visitor's eye is attracted by the pinkish color of wild geranium *(Geranium maculatum)*, sometimes called cranesbill because its seed capsule resembles a crane's bill. The color of the flower of this one- to two-foot plant varies from a pale to a deep magneta-pink and light purple; sometimes its anthers are a peacock-blue. This is a very delicate flower, which may drop its petals if unduly disturbed.

Every year toward the end of May I visit a deeply wooded area west of the Bronx River in search of the moccasin-flower *(Cypripedium acaule)*. Years ago plants were plentiful, but the number has been diminishing and last year (1963) not a single plant was in evidence. Happily, however, they were to be seen in the new Native Plant Garden near the Thompson Memorial Rock Garden.

In the same garden the large-flowered trillium *(T. grandiflorum)* was also seen. Nature photographers are delighted to come upon this handsome species with its deep green leaves and waxy white flowers. The plant's graceful symmetry makes a very pretty picture.

Crossing a field of meadow grass on the west side of the river, I came upon a sizeable patch of wild strawberry *(Fragaria virginiana)* in full bloom. The berries are a treat for some of our avian friends, as those who have tried to grow strawberries in their gardens know.

In contrast to the white petals of the strawberry blossoms, I noticed scattered deep in the grass and decaying leaves the blue flowers and deep green, heart-shaped leaves of one of the best known of our spring wild flowers, the common violet *(Viola papilionacea)*. This species, widely distributed in the East, grows abundantly in fields, light woodlands, and along roadsides.

The golden-yellow flower of the dandelion *(Taraxacum officinale)* brightens fields from May through June, then retires and is replaced by its relative, the fall dandelion *(Leontodon autumnalis)*, which shows its colorful flower from July until November. Perhaps if the dandelion did not invade cultivated lawns, it would be held in respect, for the dandelion is indeed a beautiful flower and is also beneficial to man. From its roots a drug is obtained; the leaves, rich in vitamins are used in salad; and the flower is used to make a wine.

(To be continued)

TREE FRUIT VARIETIES (Continued from page 90)

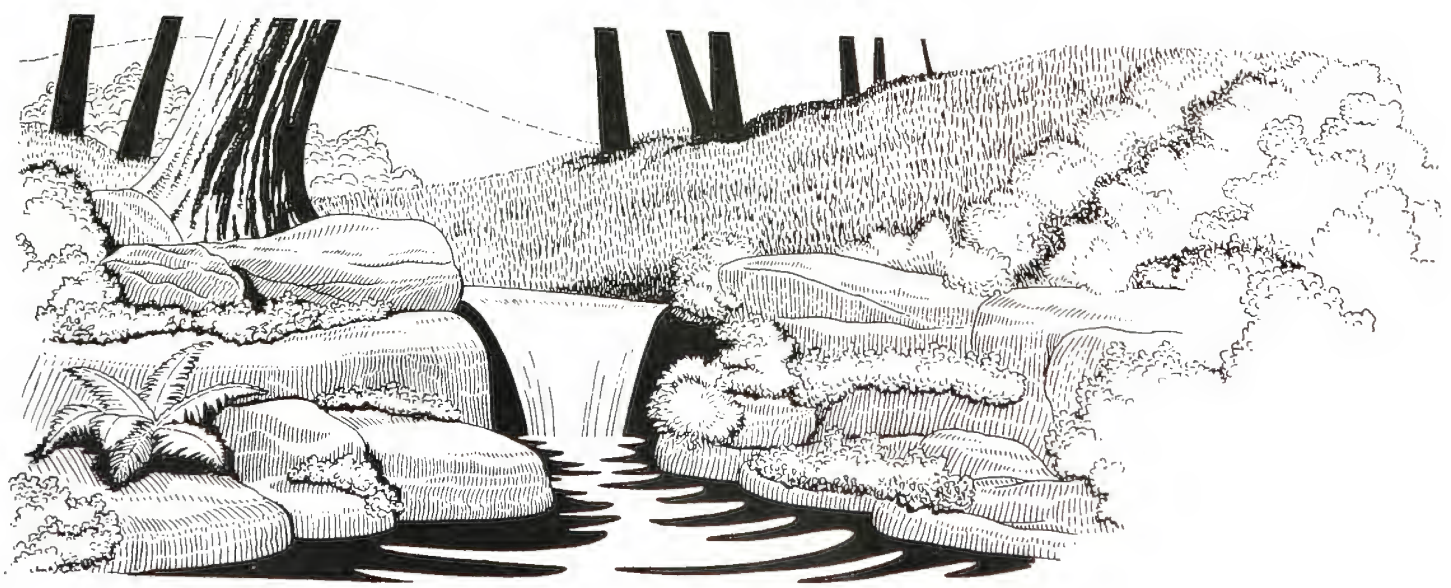
effects upon the resulting tree. Truly clonal dwarfing rootstocks for stone fruits, as EM IX for the apple, are still unknown. With the exception of the sweet cherry tree, most other stone fruit trees on their conventional seedling rootstocks can be held to a smaller size by pruning; hence the need for size-controlling rootstocks for these fruits has not been as great as for apples and pears. However, tests are under way to control the size of a sweet cherry tree either by an appropriate dwarfing stock or by an interstock which is able to slow down the growth of the varietal fruit-bearing top.

As a possible dwarfing rootstock for the sweet cherry, seedlings of the ground cherry (*Prunus fruticosa,* Pall) have been tried. The ground cherry is a natural dwarf plant which can serve as a size-controlling rootstock. However, when so used it has sent up suckers from its root system freely. Such sucker growth is very undesirable and difficult to control, and other means of using P. *fruticosa* as the size-controlling medium have to be found. One of the ways is to interpose between conventional cherry rootstocks, such as the wild sweet cherry, P. *avium,* or the perfume cherry, P. *mahaleb,* a *P. fruticosa* trunk on which to graft the fruit-bearing varietal top. Trees constructed in this way are under observation, but are not old enough to prove or disprove whether *P. fruticosa* is useful as a size-controlling interstock. The other way to obtain possible tree-size control is to graft a sweet cherry scion on a particular sour cherry variety, namely 'North Star'. 'North Star' is a natural dwarf plant, so there should be some dwarfing effect on the sweet cherry variety that is grafted to a 'North Star' trunk.

I have tried, in this article, to acquaint the home gardener with fruit tree rootstocks, particularly those which might help him to grow the different tree fruit varieties as small, so-called dwarf trees.

Comes the lure of green things growing,
Comes the call of waters flowing—

CHARLES GEORGE DOUGLAS ROBERTS



COMING EVENTS

at

THE NEW YORK BOTANICAL GARDEN

(For more complete information about a particular event, write or phone LU 4-8500.)

ANNUAL MEETING OF THE AMERICAN ROCK GARDEN SOCIETY on Saturday, May 2, 1964, 10 a.m.-4 p.m., Lorillard Snuff Mill at the Garden.

ANNUAL MEETING OF THE CORPORATION OF THE NEW YORK BOTANICAL GARDEN on Monday, May 4, 1964, 2:30 p.m., Lorillard Snuff Mill at the Garden.

"PLANTS AND SCENES OF MEXICO," illustrated Saturday Afternoon Lecture by Walter Singer, Staff Photographer, on May 9, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

MEETING OF CACTUS AND SUCCULENT SOCIETY OF NEW YORK, on May 10, 2 p.m., Auditorium of the Museum Building.

Visitors enjoy the Snuff Mill terrace above the Bronx River.

"WILD FLOWERS OF NORTH AMERICA," illustrated Lecture by Dr. H. W. Rickett, Senior Curator of Botany, on May 16, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

MEETING OF BONSAI SOCIETY OF GREATER NEW YORK, on May 20, 8 p.m., Auditorium of the Museum Building.

SPRING GARDEN TOUR, sponsored by Volunteer Associates, The New York Botanical Garden, to Far Hills, Somerville, Peapack, and Gladstone, New Jersey, on May 21, 1964. For information write Volunteer Associates, 22 East 60th Street, New York, New York, 10022.

"PAPUA AND NEW GUINEA," "The Jackeroo," and "Australian Food Parade," movies in color by Australian News and Information Bureau, on May 23 at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

EXHIBIT OF SIXTY-THREE CALIFORNIA WILD FLOWER PAINTINGS by Jane Seymour Pinheiro, May 1-31, 1964, in Museum Building.

EXHIBIT ON GOLDEN JUBILEE OF THE BRONX—dramatic photographs from The New York Botanical Garden's archives, contrasted with photographs of parallel present-day events. In May (date not yet set) in Museum Building.

MAY-FLOWERING—azaleas, lilacs, dogwood, wistaria, viburnums, hawthornes, rhododendrons, mountain-laurel, early peonies, iris, tulips.

ROSE DAY, June 7th—Lecture, demonstration, question and answer period, 2-4 p.m., in Auditorium of the Museum Building; Rose Garden, 4-6 p.m.

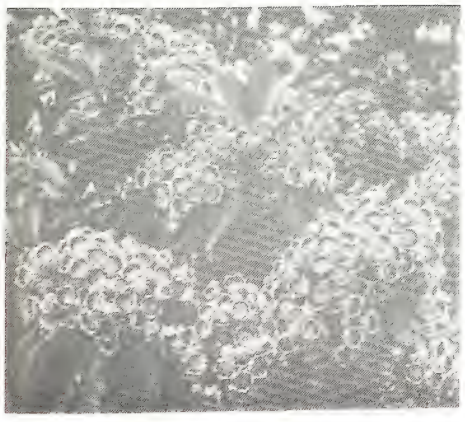
MEETING OF CACTUS AND SUCCULENT SOCIETY OF NEW YORK, on June 14, 2 p.m., Auditorium of the Museum Building.

GRADUATION RECEPTION of the Two-Year Courses in Botany and in Practical Gardening, on June 16, 8 p.m., Auditorium of the Museum Building.

While staff members of the Garden answer visitors' questions on Rose Day, another visitor takes a close-up picture of a rose.

HORTICULTURE SCHOOL, Federated Garden Clubs of New York State, Inc., on June 16-18, 10 a.m.-4 p.m., Snuff Mill.

JUNE-FLOWERING—roses, peonies, lilies, tropical water-lilies, hydrangeas, mountain-laurel, tuliptree, Japanese dogwood, mock-orange, stewartia.



MOUNTAIN-LAUREL AT THE GARDEN

Mountain-laurel *(Kalmia latifolia)* presents a beautiful display at the Garden. Last May especially, the shrubs flowered prolifically and delighted many visitors with the delicacy of the form and coloring of their blooms, some being almost a pure white, others shell-pink to deep rose, still others white or faintly pink and marked or ringed with dark crimson. This year holds promise of good flowering.

Fifty specimens were set out near the entrance to the Thompson Memorial Rock Garden in 1937. The planting today includes a number of seedlings of the original plants; also of the freak form, known as *K. latifolia polypetala* Nicholson, syn. *K. latifolia monstruosa* Mouileff, which has a deeply divided corolla, the threadlike petals giving the flower a fringed appearance like that of the flower of the fringe-tree, *Chionanthus virginica*. The original specimens of this monstrous form of *K. latifolia* came to the Garden in 1925 from Dr. George K. Stone of Amherst, Massachusetts; it was described in 1870 by Asa Gray from plants collected near South Deerfield.

NEWS, NOTES and COMMENTS

Activities of the Director and Staff. During recent months Dr. William C. Steere, Director, addressed the Women's Auxiliary of the New York Academy of Sciences in New York City and participated in the eighteenth annual Williamsburg Symposium. He gave the principal address at the annual banquet—his subject, "Arctic Relatives of our Garden Flowers." He served as Co-chairman with Dr. James A. Oliver, Director of the American Museum of Natural History, of the Eighth Annual Conference of Systematic Collections which was held in New York City; attended the meeting of the Board of Trustees of Biological Abstracts in Philadelphia, the dedication of the new Administrative Building of the United States National Arboretum in Washington, D. C., the meeting of the Board of Managers of the Morris Arboretum in Philadelphia, and the Conference of Biological Editors in Ann Arbor, Michigan. On May 21, Dr. Steere will deliver an address before the Yonkers Elementary Teachers' Council in Yonkers, New York, and a month later will depart for field work in Iceland before attending the International Botanical Congress to be held in Edinburgh, Scotland, August 3-12, 1964.

Dr. Pierre Dansereau, Assistant Director (Botany), gave two lectures in Ottawa at the National Museum and one at the University of Ottawa in February; in March, he took part in a symposium on the teaching of science, organized by the science students of the Université de Montréal and lectured before the Biology Department of Manhattan College on "Mapping the Vegetation of Puerto Rico." Accompanied by Hyrum Johnson, graduate student, Dr. Dansereau spent a week in the Gaspé Peninsula, investigating the winter aspect of the plant communities they had studied last summer.

Under a grant from the Conservation Foundation, Dr. Dansereau will spend six weeks in the Azores from mid-May till the end of June. He will be joined by Dr. A. R. Pinto da Silva of the Estação Agronómica Nacional of Portugal. Together they will study zonation of plant communities, especially on Terceira and Pico. John Milton, of the Conservation Foundation, will assist Dr. Dansereau in preparing a report on land use and conservation in the Azores.

Dr. Dansereau has just published a book entitled *Contradictions & Biculture* (Editions du Jour, Montréal). This bilingual title covers a series of nineteen essays written in the years 1956 to 1961: eight of them are in French and eleven of them in English.

Dr. Arthur Cronquist, Curator, started the middle of April for Nevada and Utah to engage in field work on the intermountain flora for six weeks. Before his departure, Dr. Cronquist read the page-proofs of the new book *Natural Geography of Plants* by Gleason and Cronquist, scheduled for publication this spring by Columbia University Press.

Dr. Harold William Rickett, Senior Botanist, spent three weeks in March in several southern states, talking to collaborators for Volume II of the Wild Flower Series of The New York Botanical Garden. He became acquainted with country he had not seen, took photographs, and looked up people who have photographs. This is a counterpart of the trip Dr. Rickett made last summer to western United States in preparation for Volume III, though of shorter duration. On May 1, he consulted with the Advisory Committee of the Hunt Botanical Library on the preparation of the facsimile of Walahfrid Strabo: *Hortulus*.

Dr. Caroline Allen, Research Associate, will spend several weeks this summer visiting the major herbaria of Europe to study types and other critical collections of the *Lauraceae* of Tropical America; and will attend the Tenth International Botanical Congress to be held in Edinburgh in August.

Dr. David J. Rogers, Curator of Taxonomic Botany, attended the fifth annual meeting of the Society for Economic Botany, held in March, 1964, at the University of North Carolina, Chapel Hill. The theme of the two-day meeting was "Plant Fibers in the Modern World." Dr. Rogers is Managing Editor of the Society's quarterly, *Economic Botany*.

He will present a paper on "Translation of Taxonomic Methods to Computer Language—Theory and Practice" in the symposium on "Data Processing and The Use of Computers in Botany" at the International Botanical Congress in Edinburgh. The symposium will be chaired by Dr. G. C. Ainsworth, Assistant Director of the Commonwealth Mycological Institute at Kew, and Dr. Steere. Henry S. Fleming, Research Associate, will accompany Dr. Rogers to the Congress. They expect to examine herbarium type specimens in the Muséum National d' Histoire Naturelle in Paris before returning to this country. They will participate in an invitational symposium, entitled "Specialists' Conference on Microbial Classification," to be held under the auspices of the National Research Council of Canada in Quebec City, August 30-September 5, 1964.

Dr. P. P. Pirone, Senior Plant Pathologist, attended the tree planting ceremony on April 24, 1964, in memory of Dr. Francis A. Bartlett, founder of the Bartlett Tree Expert Company at Stamford, Connecticut.

T. H. Everett, Assistant Director (Horticulture) paid fitting tribute to E. J. Countey who was honored, on his retirement, at a party in the Snuff Mill on March 19, 1964, by members of the staff and other employees of the Garden. Mr. Countey, now on terminal leave and vacation until the end of August, and Mrs. Countey (in the foreground) are enjoying Ireland. Mr. Countey has been head of the Accounting Department since he came to the Garden in 1935.

Dr. Lyman B. Smith, Curator, Division of Phanerogams, Smithsonian Institution, called upon Dr. Bassett Maguire at The New York Botanical Garden, when he was in the city to speak to the Greater New York Bromeliad Society on "Bromeliads." Dr. Smith, the authority on *Bromeliaceae*, is nearing the completion of his monograph on the family.

Dr. Marjorie Anchel, Senior Research Associate, spoke on "Problems Connected with Distinctive Mold Metabilites," before the Fordham University Chapter of the Sigma XI.

Dr. Annette Hervey, Senior Research Associate, addressed the winter meeting of the Advisory Council on "Laboratory Reesarch at The New York Botanical Garden."

At a dinner in honor of distinguished alumni, held in March, 1964, celebrating the eightieth anniversary of the founding of Temple University, "Elizabeth C. Hall, presently Associate Curator of Education, formerly Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden" was "one of eighty selected for recognition." Miss Hall is a graduate of Ambler School of Horticulture, now Ambler Campus of Temple University.

Phil Clark, Assistant to the Director (Public Relations), Dorothy Ebel Hansell, Editor of *The Garden Journal*, and Walter Singer, Staff Photographer, attended the regional meeting of the Garden Writers' Association of America, held at the Coliseum, New York City, during the week of the International Flower Show. Mrs. Hansell was a guest at the reception sponsored by the staff of *Popular Gardening* in honor of Beverly Nichols, author, and at the luncheon for garden authors given by D. Van Nostrand Co. Inc., of Princeton, New Jersey; both events were held at the Essex House during the International Flower Show. She attended the meeting of the Holly Society of America held at Longwood Gardens, Kennett Square, Pennsylvania, and the dedication of the new Administrative Building of the United States National Arboretum in Washington, D. C., in April.

Dr. Elva Lawton of the Department of Botany, University of Washington, Seattle, worked in the Elizabeth Britton moss herbarium for a month this past winter. Dr. Lawton examined mosses for her project, a Moss Flora of the Pacific Northwest. Her particular interest on this visit was the taxonomy and distribution of species of *Orthotrichum*.

Stanley J. Smith, Curator of the herbarium of New York State Museum at Albany, consulted with members of the staff in the Garden's Cryptogamic Herbarium on the bryophytes and fungi of New York State for a week during February. He also worked in the Phanerogamic Herbarium on rushes and grasses.

Dr. Kjeld Holmen was at The New York Botanical Garden from January 8 to March 12, 1964, collaborating with Dr. Steere in research on Arctic mosses. This is his second visit to the Garden.

Dr. Holmen spent the summers of 1960 and 1961 in Arctic Alaska with Dr. and Mrs. Steere, and they spent the summer of 1962 with him and Mrs. Holmen in west Greenland. Dr. Steere has also worked with Dr. Holmen in the Botanical Museum in Copenhagen on two occasions.

Dr. Holmen holds the Chair of Arctic Botany at the University of Copenhagen, Denmark, with the title of University Lektor. He is also curator of the Arctic herberium and the bryophyte herbarium of the University's Botanical Museum. The outstanding authority on the flora of Greenland, the higher plants as well as the mosses, he has spent many field seasons in Greenland, including at least one winter in the northeastern section. He has also done much work in northern Lapland, where he has led classes in summer field courses, and has visited Iceland several times. Dr. Holmen has published extensively on the taxonomy, floristics, and cytotaxonomy of mosses and of higher plants, and is joint author of a very useful Flora on Greenland.

Visitors to the Garden

Dr. Kenneth J. Hood, Republic Aviation Corp., Long Island, New York.

Dr. Louise Heimbeck, Oslo, Norway.

Dr. A. Lindemayer, Queens College, Flushing, New York.

A. Thumbimayagan, Mashur, India.

P. S. Miles, Smithsonian Oceanographic Sorting Center, Washington, D. C.

R. Roseman, Cold Spring Harbor, Long Island, New York.

Dr. Neal A. Weber, Swarthmore College, Swarthmore, Pa.

Dr. Helen L. Jeffrey, National Institutes of Health, Washington, D. C.

Dr. Lyman C. Craig, The Rockefeller Institute, New York, N. Y.

Dr. F. M. Strong, University of Wisconsin, Madison.

Dr. Edgar T. Wherry, Department of Botany, University of Pennsylvania, Philadelphia.

Dr. L. A. Anderson, Duke University, Durham, N. C.

Dr. Lyman B. Smith, Smithsonian Institution, Washington, D. C.

Dr. Angel Cabrera, Institute de Botánica, La Plata, Argentina.

T. D. Pennington, Forestry Department, University of Oxford, Oxford, England.

Dr. Richard M. Lewis, Curator, Cornell Plantations, Cornell University, Ithaca, N. Y.

National Science Foundation has awarded a grant of $26,500 to The New York Botanical Garden for the support of research entitled "Functional Analysis of Plant Communities" under the direction of Dr. Pierre Dansereau for a period of approximately two years beginning April 1, 1964.

Visitors relax in the Native Plant Garden of The New York Botanical Garden, while they feed birds which frequent this quiet retreat.

Pan American Week was marked by exhibits and a lecture on tropical plants at The New York Botanical Garden, April 12-19, 1964.

Highlight of the observance was an illustrated talk by Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Research at the Garden. He discussed explorations in which he has led The New York Botanical Garden teams into South American jungles for twenty years. An exhibit in the Museum showed momentoes of over one hundred explorations to tropical America in the past fifty years.

Living, flowering plants from the hemisphere's tropics, labeled with their countries of origin, were displayed in the Wardian cases in the Museum Building.

Pan Americanism is a year-round concept with The New York Botanical Garden. Its Herbarium and Library are among the most complete in the world for their western hemisphere collections, and its publications, explorations, and scientific research have always emphasized the hemisphere.

The International Horticultural Exhibition, which opened in Vienna on April 16, will continue until October 11, 1964. The exhibition stretches over 247 acres in the northern part of the city, about two and a half miles from the center. From the restaurant on top of the town, over eight hundred feet high, visitors will enjoy a unique view of Vienna and the surrounding countryside, including the famous Vienna Woods, the foothills of the Alps, the "March-

The number of visitors to the Easter Show in the Conservatory of The New York Botanical Garden broke attendance records.

feld," and the rolling hills where grapes are raised.

These are the dates of special exhibits: rhododendrons, azaleas, cinerarias, etc., April 16-20; industrial, May 26-June 2; fruits, vegetables, and flowers, June 12-16; cut roses, June 26-30; animals in home and garden, July 17-21; flowers, August 14-18; landscape gardening technique, August 25-31; fruits, vegetables, and wines, September 18-22; potted plants, greenhouse cut flowers, October 4-11.

Festival of Tree Peonies. Genichi Akalani, representing the Japanese Ambassador to the United States, will open the gardens of William Gratwick, Pavilion, New York, on May 22, 1964. The gardens will be open to the public until the height of the blooming season is past. A special of this year's festival will be the reopening of the formal garden area constructed in 1909 by Mr. Gratwick's father. Abandoned for the past twenty-five years, it has been restored for this event and replanted with hybrid peonies.

Mr. Gratwick's collection is considered one of the most complete in the world, comprising species and many strains and varieties. The number of blooms is estimated at twenty-five thousand. The collection includes the best of the Japanese peonies selected by the Chugai Shokubutsee Yen in 1934 for this garden, as well as the exciting new race of *P. lutea* hybrids created by the late Professor A. P. Saunders of Clinton, New York. Mr. Gratwick and Nassos Daphnis have accomplished the breakthrough into a lineage of second and third generation hybrids, unique for their vigor and well-formed, large flowers on strong, upright stems.

General Bionomics, Inc., is the research association recently formed by Dennison Morey, who for the past twelve years has been director of the West Coast Research Station of the Jackson & Perkins Company.

The new firm, located in Santa Rosa, will specialize in applied research in the biological sciences with special attention to the field of ornamental horticulture. According to Dr. Morey, research will be concentrated on those fields in which improvement will bring about the greatest benefit and profit to the nurseryman and home gardener alike. In addition to introducing new plant varieties and modern hybridizing techniques, and improving old ones, a comprehensive testing program will be initiated to evaluate available plants and related products now offered through retail outlets to the gardening public.

General Bionomics will devote its efforts at first to roses, not only because there is an intense need for better new varieties, but also to attack the inherent problems of hardiness and disease-resistance in these flowers.

Other projects in the planning stage include work on dwarf fruit, hardy English walnuts, blight-resistant chestnuts, hardy garden chrysanthemums, ever-blooming lilies, low-temperature table grapes, tall phlox for the Pacific States and new phlox for the East Coast, low chilling peonies, and new varieties of lilacs for ordinary climates.

Dr. Morey has also been a consultant to the Lane Publishing Company and California Spray Chemical, and is the author of numerous articles, booklets, and pamphlets on various phases of horticulture. He is the originator of over thirty varieties of roses, including two All-America Rose Selections 'Fusilier' and 'King's Ransom', and Rose of the Year 'South Seas'. He holds the degrees of A.B. and M.A. from Washington University Henry Shaw School of Botany, and a Ph.D. in biology from Stanford University in Palo Alto, California.

Horticulture presented a very attractive new format with its March, 1964, issue. The official publication of the Massachusetts Horticultural Society made its initial appearance as a weekly in 1904, "dedicated to the florist, plantsman, landscape gardener, and kindred spirits." The Society was founded in 1829.

Five prominent horticulturists will serve as editorial consultants: Dr. R. C. Allen, Director of Kingwood Center, Mansfield, Ohio; Mrs. Ernesta Ballard, Executive Secretary of The Pennsylvania Horticultural Society, Philadelphia; Dr. George H. M. Lawrence, Director of The Rachel McMasters Miller Hunt Botanical Library, Carnegie Institute of Technology, Pittsburgh; George Slate, Professor of Pomology, New York State Agricultural Experiment Station, Cornell University, Geneva; and Dr. Donald Wyman, Horticulturist of the Arnold Arboretum, Jamaica Plain, Massachusetts. Edwin F. Steffeck is Editor, Laura R. Hatton and Richard C. Hands, Assistant Editors.

The Nineteenth American Horticultural Congress will be held September 30-October 3, 1964, in New York City, with headquarters at the Hotel Commodore, under the auspices of the American Horticultural Society. The Garden Writers' Association will convene on the day previous, September 29, and the American Association of Botanical Gardens and Arboretums will meet during the Congress and on the day following, October 4.

September 30 has been designated as "American Horticultural Society Day" at the New York World's Fair, where talks will be given on the landscaping and operation of the Fair by heads of these departments.

October 2 will be spent at The New York Botanical Garden, which has planned a varied program to appeal to the several interests represented by the members of the American Horticultural Society, the American Association of Botanical Gardens and Arboretums, and the Garden Writers' Association.

During the Congress days there will be conducted tours to the Brooklyn Botanic Garden, Queens Botanical Gardens, Old Westbury Gardens, Planting Fields Arboretum, Sterling Forest, and elsewhere. At the luncheons, dinners, and plenary sessions, talks will be given on popular and scientific topics by prominent leaders in their respective fields.

Hosts are the Brooklyn Botanic Garden, The New York Botanical Garden, the Queens Botanical Gardens, The Horticultural Society of New York, the New York Florist's Club, and the

Richard J. Brown, Superintendent of Buildings and Grounds, photographed Walter Singer, Staff Photographer, as the latter rode in the "bucket" of the high range aerial tower to take a bird's-eye picture of the Propagating Range.

New York State Nurserymen's Association. Dr. Albert J. Irving is General Congress Chairman.

Plants of Hawaii had a major influence on the design of the exhibit for the State of Hawaii at the New York World's Fair. "Hawaii is renown for its heterogeneous composition of races—all working together for the common good," said Reino Aarnio, A. I. A., "and its plant life follows suit. There is little vegetation native to the Island; nearly all was brought to it by different settlers.

"The landscaping," he continued, "was a particularly delicate matter. Almost all the plants are of tropical nature, and had they been brought here too early, the weather in New York could have killed them."

Provisions were made to have propane heaters available to keep the plants warm on their arrival. The tropical nature of the landscaping necessitated additional expense, for the Hawaiian Exhibit is the only exhibit at the Fair from which the landscaping will be removed at the end of the first season and replaced when the Fair reopens in 1965.

According to Everett Conklin, the landscape contractor for this exhibit, there are six varieties of palm trees, ranging in height from eighteen to thirty-five feet. The queen palm, *Cocos plumosa,* is represented as also the more commonly known coconut palm, *C. nucifera.* Papaya, *Carica papaya,* from which the juice is extracted for a popular fruit drink, is also to be seen, and there are a pineapple field and a smaller field of sugarcane.

Other plants include *Monstera deliociosa,* the rare white form of the bird-of-paradise flower *(Strelitzia reginae),* hibiscus, anthurium, oleander, croton, *Cordyline terminalis* or green ti, from which the Hawaiian "grass" skirt is made, ginger, oleander, lotus, and orchids in great variety.

Four gardens have been included in the landscaping of the Julimar Farm Pavilion at The New York World's Fair.

The State of Hawaii's exhibit at The New York World's Fair has been greatly influenced by its plant life, forms and patterns of which have inspired the architectural conception for the buildings.

The Julimar Farm Pavilion at the New York's World Fair has been designed by famed architect Edward Durell Stone. Ninety-five percent of the thirty-five-thousand-square-foot area of this exhibit at the New York World's Fair will be landscaped. Four separate gardens are included in the scheme: the herb garden, the "touch and smell" garden for the blind; the English garden with a broad expanse of lawn surrounded by annuals, perennials, shrubs, and trees and featuring a pool; the Renaissance Garden with formal garden paths, clipped evergreen hedge, pools, and fountains; the terrace garden and penthouse; and a Japanese stone garden with tea house, sculpture, bonsai, and flowering shrubs. Mr. Stone's son, Edward Durell Stone, Jr., landscape architect of Fort Lauderdale, Florida, has designed the gardens.

Julimar Farm Corporation was created by Mrs. J. Phelps Revson to handle the quality products which were made and used on the farm in Weston, Connecticut, generations ago. The organization will also provide "packaged gardens," whereby clients may have their own property custom-landscaped for a nominal fee with plants installed by local nurserymen.

Water-lily 'Margaret Mary' can be grown indoors in an aquarium which receives sunlight or light from a "Gro-Lux" or equivalent bulb. This new variety, light blue, the center filled with yellow stamens, is viviparous, young plants developing from the center of matured leaves. Dr. G. L. Thomas, Jr., author of *Garden Pools, Water-lilies and Goldfish,* who originated this variety, named it after the great-granddaughter of G. Leicester Thomas, the founder of Three Springs Fisheries of Lilypons, Maryland.

(Continued on page 120)

Please note that Book Service can accept orders only for books priced at more than one dollar because of publishers' regulations and requirements.

BRIEF NOTES ON RECENT BOOKS

FLOWERS

THE POLYANTHUS: ITS HISTORY AND CULTURE. Genders, Roy. 231 pages, illustrated, indexed. Charles T. Branford Co., Newton Centre 59, Mass. 1963. $6.50.

Mr. Genders, who is a prolific writer on garden subjects, has done a good job on his latest book. He's been growing polyanthus for some thirty years and is familiar with the modern American strains, developed largely on the Pacific Coast, as well as with the modern English strains. *The Polyanthus* should be well received on both sides of the Atlantic by amateur and commercial growers.

CHRYSANTHEMUMS FOR EVERYONE. Loads, Fred W. 90 pages, illustrated. Sportshelf, New Rochelle, N. Y. 1963. $1.50.

Written, in Great Britain, for the novice on growing chrysanthemums in the garden or greenhouse, the book was first published in 1955. This revised edition includes advice on the "ring culture."

GREENHOUSE PLANTS FROM SEED. Genders, Roy. 112 pages, illustrated, indexed. Sportshelf, New Rochelle, N. Y. 1963. $1.50.

This guide to the greenhouse culture of many plants—achimenes, begonias, calceolarias, chrysanthemums, cinerarias, cyclamen, primulas, and so on, is one of Foyles Handbooks. Written in England by a good grower, it was first published in 1961.

GARDENING

YOUR FLORIDA GARDEN SOILS: Edson, Seton N. 150 pages, illustrated, indexed, glossary. University of Florida Press, Gainesville. 1963. $4.50.

In this little book, an addition to the Know Your Florida Series, Professor Edson, who has taught soil microbiology and soil conservation, has compiled the most frequently asked questions and prepared reliable answers under these topics: Florida Soils, Conservation; Fertility, Management, and Plant Growth; Organic Matter, Mulches, and Composts; Moisture and Temperature; Fertilizers; Testing and Control of Acidity; Hunger Signs in Garden Plants; Friendly Organisms and Their Care; Harmful Organisms and Their Control.

TAKING THE ACHE OUT OF GARDENING. Dudley, Stuart. 139 pages, indexed. Sportshelf, New Rochelle, N. Y. 1964. $3.75.

There is helpful advice on applying modern techniques, power equipment, modern tools, and even gadgets to reduce the number of strenuous man hours spent in the home garden, and parts of the book are enjoyable reading. But this English author, "a one-time farmer and garden owner of long experience," makes some inaccurate statements such as "The climate over the greater part of the United States is subtropical verging on tropical," which have caused the reviewer to wonder how carefully he observed conditions when he came to this country.

TRADITION OF JAPANESE GARDEN. Horiguchi, Sutemi. 185 pages, illustrated. Kokusai Bunka Shinkokai, Japan. Distributed by East West Center Press, Hawaii. 1962. $15.00.

This book, originally published in 1962, is a companion volume to *Architectural Beauty in Japan*, published some years ago. It delves into the traditions of the art of Japanese gardens—"whose objective is to create a consistent universe out of a great variety of materials . . ." It is profusely illustrated, and many of the enchanting pictures would serve as guides to any one in this country wishing to introduce the Japanese influence into his own garden.

LANDSCAPING

A GUIDE TO LANDSCAPING. Fortune, Maxine. 123 pages, illustrated, indexed. Great Outdoors Publishing Co., St. Petersburg, Fla. 1963. paperback $1.00.

The author, an artist, who has been sketching plants for easy identification while she has been engaged in landscape designing these past six years in Florida, was prevailed upon to consider publication. Art von Waldburg, a landscape architect of thirty years experience in South Florida, helped in checking the drawings—each plant was sketched from a living representative in one of the tropical gardens (Fairchild Gardens, Arboretum Exotica) or prominent nurseries—and with the plant descriptions.

Florida gardeners should welcome this little book; and gardeners elsewhere, who enjoy reading about plants and seeing them well illustrated, may also like to add it to their libraries.

HOW TO LANDSCAPE YOUR HOME. Bushey, Donald J. 293 pages, illustrated, indexed. McGraw-Hill Book Company, New York. 1964. paperback $2.95.

The author, Professor of Ornamental Horticulture at Cornell University, has written a good book, one which home owners can grasp and follow. It was originally published under the title *A Guide to Home Landscaping* in 1956.

Through conversation with many home owners during his extensive teaching in landscaping, and by visiting their properties, he has learned first-hand what their problems are, what they want to know. Dr. Bushey gives step-by-step plans and procedures which can be adapted to various situations.

The plant lists, under different headings and occupying the last thirty-five pages, are useful, too; information includes common and botanical names (and pronounciation of the latter) and important characteristics.

HOW TO LANDSCAPE YOUR OWN HOME. Rodale, J. I., and Staff. 1544 pages, illustrated, indexed. Rodale Books, Inc., Emmaus, Pa. 1963. $9.95.

Under this title, which is not indicative of the comprehensive scope of this volume, not only the landscaping but the planting and the care of the home property is covered by the organic method of gardening. There are seven sections — Landscaping, Garden Operations, Lawns, Trees, Shrubs and Vines, Herbaceous Ornamentals, and Ornamentals Indoors. To give readers some idea of the coverage, here are the headings under Section 1, Landscaping: Selection of a Home Site, Plan Before You Plant, Engineering Problems in the Home Grounds, Public Areas, Outdoor Living Areas, The Service Yard, The Hardy Border, Formal Gardens, Rock Gardens and Naturalistic Plantings, Bog and Water Gardens, Wild Gardens, and under Section 2, Garden Operations: Garden Calendar, Laying the Organic Foundation, Climate and Your Ornamentals, Propagation and the Home Nursery, Garden Maintenance, Pruning Ornamentals. Three hundred pages are given over to tables.

How to Landscape Your Own Home is printed on fine paper (Crocker Burbank Bible) for durabiltiy.

LANDSCAPING FOR FLATS. Ministry of Housing and Local Government (Her Majesty's Stationery Office). 65 pages, illustrated, bibliography. British Information Services, New York. 1963. $1.70 paper.

This "treatment of ground space for high density housing estates" is useful primarily to city planners, but may prove of interest to apartment dwellers who have an area to be landscaped, especially the list of shrubs and trees. This list gives descriptions, climatic conditions, and cultural notes, and the majority of the plants may be grown in this country, which is not always so of English publications.

YOUR GUIDE TO FLORIDA LANDSCAPE PLANTS, II: TROPICAL EXOTICS. Watkins, John V. vii-xv + 137 pages, illustrated, indexed, glossary. University of Florida Press, Gainesville. 1963. $6.50.

A companion volume to *Your Guide to Florida Landscape Plants* I: *Trees, Palms, Shrubs Vines,* it fills the demand for information on tropical exotics which are used outdoors and indoors in the Sunshine State. The plant descriptions, one to a page, are accompanied by line drawings and notes on soil requirements, culture, propagation, pests, and so forth. Introductory chapters cover the Care and Feeding of Tropical Exotics, Propagation, Pest Control Guide.

FLORALS

FAMILIES OF FLOWERING PLANTS OF SOUTHERN AFRICA. Riley, Herbert Parkes. 269 pages, illustrated, bibliography, indexed. University of Kentucky Press, Lexington, Ky. 1963. $14.00.

Dr. Riley has had a special interest in the flower of southern Africa for a number of years. While there in 1955 as a Fulbright scholar, he took colored photographs of many plants, and 81 of the 144 colored plates are reproduced from them. The families of the flowering plants found in that part of the world are discussed, followed by a treatment of the genera. The economic uses of the plants are given, also the superstitious application by the natives; and the chromosome count where known is included.

CROPS

FRUIT CULTURE IN INDIA. Singh, Sham, S. Krishnamurthi, and S. L. Katyal, compl. by Indian Council of Agricultural Research, New Delhi, India. 1963. $2.00.

The information on the various fruits cultivated in India has been assembled in three parts under the above title: 1) Cultural practices. 2)

Individual fruit crops in order of economic importance and 3) Cold storage and preservation of fruits and preparation of fruit products. The book is intended as a guide to the amateur, professional, and commercial fruit grower.

BLACK CURRANT VARIETIES: THEIR CLASSIFICATION AND IDENTIFICATION. Todd, J. C., Ministry of Agriculture, Fisheries, and Food. 92 pages, illustrated. British Information Services, New York, N. Y. 1962. $2.00.

This bulletin, No. 11, explains the author's new system of classification, which he developed while working at the National Fruit Trials at Brogdale and Wesley, and gives detailed description of varieties.

MISCELLANY

CREATE NEW FLOWERS AND PLANTS . . . Indoors and Out. James, John. 212 pages, illustrated (part colored) indexed, glossary. Doubleday & Co., New York. 1964. $4.95.

The author, who has developed new varieties through selection and hybridization and has experimented with plant mutation through radioactive procedures, tells the amateur gardener about the flowering process, the living cell, hybridization, and mutation in non-technical language.

GARDENS AND PEOPLE. Steele, Fletcher. 221 pages. Houghton, Mifflin Co., Boston. 1964. $4.00.

Mr. Steele, one of the deans of landscape architecture in America, has created a number of beautiful gardens, including that of Miss Mabel Choate's in Stockbridge, Massachusetts, now the property of the Trustees of Public Reservations. This book, intimate, personal, reflects his wide knowledge of people, plants, nature, and design.

FOREST PRODUCTS RESEARCH 1962. Department of Scientific and Industrial Research, Forest Products Research Steering Committee. 57 pages, illustrated, indexed. British Information Services, New York. 1963. $1.30.

Includes annual report of the director and "programme of research" covering such aspects as wood structure, chemistry and physics, entomology, mycology, wood preservation and seasoning, timber mechanics, woodworking, pulp and paper.

THE GENERA AND SPECIES OF ORCHIDACEOUS PLANTS. Lindley, John. 553 pages, indexed. A. Asher & Co., Amsterdam, distributed by Stechert-Hafner, Inc., New York. 1963. $25.00.

The publishers are to be congratulated on making available this classic on orchids, long out of print. Dr. Lindley, who was Professor in Botany in University College, London, and in the Royal Institution of Great Britain, spent ten years in preparation of the original edition, published in 1840.

HOW PLANTS GET THEIR NAMES. Bailey, L. H. 181 pages, illustrated. Dover Publications, Inc., New York. 1963. $1.15.

This is an unabridged republication of the book originally published by Macmillan Company in 1933.

HUNTING WITH THE MICROSCOPE. Johnson, Gaylord, and Maurice Bleifeld. 125 pages. Sentinel Books Publishers, Inc., New York. 1963. $1.00.

Of particular interest to high school students, but the novice among adults may also find some helpful instruction on using the microscope, on what to look for with such an instrument, and on preparing cultures for the study of microscopic plants and animals.

HOW TO MAKE GARDENING FUN. Jorgenson, George and Nora. 87 pages. Exposition Press, New York. 1963. $3.00.

Dr. Jorgenson is a retired pathologist and biochemist, his wife Nora a child psychologist and concert pianist. With their scientific background and their enthusiasm for growing things, they have developed one of the show gardens of the Midwest. They write about it—and how they keep their plants flourishing by foliar feeding—with understanding and quiet humor.

THE JAPANESE HOUSE: ITS INTERIOR AND EXTERIOR. Ishimoto, Kiyoko and Tatsuo. 128 pages, illustrated, glossary. Crown Publishers, Inc., New York. 1963. $5.00.

The more than two hundred photographs show how the simplicity, dignity, and grace of Japanese design can be adapted to American homes and gardens. Mr. and Mrs. Ishimoto photograph with artistry. He is the author of several books—among them *The Art of Flower Arrangement, The Art of Driftwood and Dried Arrangement's, The Art of Growing Miniature Trees, Plants, and Landscapes*—and has written for *American Home, Better Homes and Gardens, House and Garden, and Sunset.*

TAPESTRIES IN SAND: THE SPIRIT OF INDIAN SANDPAINTING. Villaseñor, David. 111 pages, illustrated (part color). Naturegraph Company, Healdsburg, Calif. 1963. $2.95.

At the age of sixteen the author's imagination was stirred by his first sight of a beautiful sandpainting created by a Medicine Man on the Navajo Reservation. Then and there, David Villaseñor decided he would some day find a way to preserve this ancient art. He has in the passing years interpreted, lectured, and written on the beauty and meaning of sandpainting. Seeds, blossoms, pollen, powdered roots and bark, corn meal are employed in the ceremonial "painting" on the ground, together with the colored sands. This unique and beautiful little book should give the reader a new appreciation of our rich heritage.

TREES

THE COMPLETE GUIDE TO NORTH AMERICAN TREES. Curtis, Carlton C., and S. C. Bausor, 342 pages, illustrated, indexed. Collier Books, 111 Fourth Ave., New York. 1963. paperback 95 cents.

Dr. Curtis, a former chairman of the Botany Department at Columbia University, and Dr. Bausor, Professor of Botany and Bacteriology of Creighton University, have collaborated on a compact manual of some one thousand trees, with concise descriptions of their general appearance, bark, roots, leaves, buds, fruit. The trees are grouped by region—northeastern, southern, and western—and there is a general key for those of the northeastern and southern region, and one for those of the western region.

Interesting comments are scattered through the pages as, for example: "Before the Wrigley habit became established among adults in America, the resinous juice of this tree *(Picea rubra)* furnished the spruce chewing gum for children."

GUIDE TO SOUTHERN TREES. Harrar, Ellwood S. and J. George. 709 pages, illustrated, indexed. Dover Publications, Inc., New York. 1964. paperback $2.25.

This non-technical book was first published by McGraw-Hill Book Company, Inc., in 1946, then republished, unabridged, by Dover Publications in 1962, and now again in 1964. The nomenclature has been revised and brought up to date.

Over three hundred and fifty trees native to the region south of the Mason and Dixon line from the Atlantic Ocean to the Florida Keys and western Texas are described by leaf, flower, fruit, bark, habitat, economic and historical importance. Dr. Ellwood S. Harrar is Dean of the School of Forestry of Duke University; Dr. J. George Harrar is President of The Rockefeller Foundation.

THE LAST REDWOODS. Hyde, Philip and Francois Leydet. 127 pages, illustrated, bibliography. Sierra Club, San Francisco, California. 1964. $17.50.

With his "conservation background, Philip Hyde has outstanding ability to interpret through a lens the qualities in native landscapes," so Newton B. Drury, a former director of the National Park Service, has said of him. And Mr. Hyde and the other photographers he called upon to assist him, have done a magnificent job in presenting *The Last Redwoods.* The black and white illustrations are superb, not only of redwoods but of woodwardia and oxalis, of horsetail against a fallen log; of landscapes; of devastated areas in "The Heroic Days"; of logging under "The New Technology." The reproductions of the colored illustrations do not quite measure up to them, the color not being true in every case.

Francois Leydet writes feelingly of these trees, the work that has been done to save them, and the urgent need for future work if great groves are not to be lost.

The New York Times, Sunday edition, April 5, 1963, carried an editorial "Redwoods Going, Going . . ," the last paragraph of which read: "As the Sierra Club suggests in its beautiful and informative new book, *The Last Redwoods,* not only are the remaining unprotected virgin redwoods rapidly disappearing, but even the protected redwoods are in danger too."

TREES OF LONG ISLAND: Supplement 1. 32 pages. Long Island Horticultural Society, Inc. 1963. 50 cents.

In 1952 the Long Island Horticultural Society published *Trees of Long Island,* based on an extensive survey, and included botanical, historical, and economic data. Now, eleven years later, after a "second census" during which 1,649 trees were reported and measured, the Society has issued Supplement 1. It is interesting to note that in the survey conducted by the Brooklyn Botanic Garden in 1922, 300 specimens were reported; in the 1952 survey, 1,025 records were made.

"The Green." The building in the background houses "Village Fare"—gourmet shop, "Katy Houghton"—antiques and "Christmas Shop"; the adjoining building on the right, "Golden Eagle"—fabrics, and "Stars and Stripes"—reproductions. The tree is sweet gum, *Liquidambar styraciflua.*

PLANTS IMPROVE SHOPPING CENTERS

Peddler's Village, Lahaska, Pennsylvania, located on Route 263 in the Delaware River country, has grown within less than two years into an attractive group of specialty shops from what was once an old chicken farm.

The Village Chit Chat reveals that almost all the buildings, except the barn which was converted into the Cock and Bull Restaurant, were chicken coops. Lahaska, appropriately enough, was called "Hentown" at one time.

The restaurant, open seven days a week—Monday through Saturday, from 11 a.m.-9 p.m., Sunday, from 12 noon-8 p.m.—and the shops, open Monday through Saturday, from 10 a.m.-5 p.m. and on Friday till 9 p.m., attract club groups which come by chartered busses as well as visitors who arrive in private cars bearing licence plates from within and without the State of Pennsylvania.

Mr. and Mrs. Earl Jamison feel that much of the growth of their enterprise in such a short period of time is due to its beautiful setting. They were weary of shopping in centers with no landscaping to break the monotony of stark stores and long lines of cars; and believing that there must be others who feel as they do, they began to travel widely to collect ideas for their venture. They passed their ideas along to Richard G. Westerfield, architect, who designed the plans for the village. Mrs. Jamison, a graduate of the School of Horticulture for Women (now Ambler Campus of Temple University) is responsible for the landscaping and pleasing plant combinations.

The Mall in Short Hills, New Jersey, is more extensive, more elaborate than Peddler's Village; but it, too, is very well landscaped with flowering and shade trees and espaliered shrubs. Bulbs in spring, annuals in summer, and chrysanthemums in fall fill the beds and borders. No shopping center, small or large, really need be unattractive.

ALICE DUSTAN KOLLAR
Morristown, New Jersey

The small greenhouse of "The Flower Tree" and gay flower-filled cart. This florist shop has fresh, dried, and artificial flowers and fruits for arrangements, as also holders and accessories, and a nice assortment of potted plants and containers.

The building at the side of "The Green" contains "Creative Hands," a hand-craft shop and "The Flower Tree," a florist shop. The shade tree is scarlet oak, *Quercus coccinea.*

BOOK REVIEWS

TREES AND SHRUBS FOR THE SOUTHEAST. Wiggington, Brooks E. 277 pages, illustrated, indexed. University of Georgia Press, Athens. 1963. $7.50.

The latest book from the pen of Brooks E. Wiggington is an excellent addition to the literature dealing with plants for the southeastern region, covering, as it does, an area from Virginia and Kentucky on the North, Gulf of Mexico on the South, between the Atlantic Ocean and the Mississippi River. The actual emphasis is placed on the materials to be used for landscape design. The problems of landscape design are outlined and the proper plant materials are suggested. Less emphasis is given to the horticultural practices and more to the selection of plants which will flourish without undue labor and care.

Being an excellent designer and a well-versed horticulturist, Mr. Wiggington succeeds very well, indeed. He discusses plant suitability to the region and design from the standpoints of form, foliage, ease of cultivation, flowers (or fruit), and rate of growth. Compatibility of one group of plants with another is given consideration from the standpoint of long term of life without the need of severe pruning and eventual removal because of size. He advises against "hodge podge," which is difficult to harmonize —thus fewer varieties. He suggest abstinence from overuse of camellias and azaleas, which constitute the basis of so many plantings of this region. Instead he suggests the use of less common, but often more satisfying substitutes.

The book is divided into chapters on vines, which he calls "the mellowing agents in the landscape"; the ground covers, which are useful because of reduction of maintenance and preservation of a year-round green cover; the lesser shrubs based on height; the major shrubs used for screening and backgrounds; the trees, large and small, which are considered the most important elements of landscape planting and thus their selection of utmost importance. The plant lists are based on ultimate size with average amount of cultural care.

In general, the book should be a valuable guide for the amateurs with its excellent, down-to-earth treatment and to the professional landscape designer, who is all too prone to disregard the sensible approach to the use of plant materials, which, in many instances, are but meaningless names used with little regard to their practicability and importance.

ALEX LAURIE
Callaway Gardens,
Pine Mountain, Georgia

CAROLINA LOW COUNTRY IMPRESSIONS. Sprunt, Alexander, Jr. 191 pages, illustrated. Devin-Adair Co., New York. 1964. $10.00.

In *Carolina Low Country Impressions* there is splendid collaboration between author and artist which has captured the mood of this romantic area. Both men live and move in the land which they describe. Mr. Sprunt is a native of South Carolina, now living in Charleston, while Mr. Dick is a Carolinian by choice. Their lives have been dedicated in large measure to the study and recording of natural life.

It is the Low Country of South Carolina which is set forth in this book. This encompasses the area from the lower edge of coastal North Carolina to the Georgia line and extends inland for seventy-five miles. On the inside of the covers of the book are enchanting maps which picture the Low Country so graphically that one feels acquainted with the region before reading the text. One sees where the ocean comes directly to the mainland making the Strand. The Barrier Beaches stretch from Myrtle Beach to Charleston. Larger sea islands border the mainland from this city southward. The large and small rivers, some of which have fascinating Indian names such as Coosawhatchie, Combahee, and Edisto are indicated.

It was along these rivers that the fabulous rice plantations flourished more than a century ago. Great houses were maintained which, for the most part, have disappeared. Too frequently all that remains to mark the sites are avenues of live oaks by which the mansions were approached.

In sixteen short chapters Mr. Sprunt has described every phase of natural life in the Low Country. Only one who knows and loves the region as he does could give such a wealth of information about it in so concise and interesting manner. He depicts life on the sea islands and salt marshes and tells of gardens and characteristic plants. He describes alligators, snakes, and turtles.

Especially is the author happy in writing of bird life and ornithology. Mr. Sprunt is a nationally known ornithologist who has several books on bird life to his credit. He has also been active in the affairs of the National Audubon Society. One envies him on his trips to Bull's Island, a United States Wildlife Refuge, which he calls "Magnificent and primeval and the gem of the Barriers." There the herons feed with egrets and ibis, gallinules and rails.

The reader is also indebted for the chapter dealing with those men who have selflessly studied bird life from early days of Colonial settlement to the present time: among them John Lawson, Mark Catesby, Audubon, Bachman, and Roger Tory Peterson. Mr. Sprunt gives a delightful account of his introduction to Mr. Peterson when the latter was very young and completely unknown. Arthur T. Wayne is the subject of the last chapter. The author pays him great tribute by saying that he stood out as *the* ornithologist of the Low Country for half a century, the period from the 1880's to 1930. Mr. Wayne added many birds to the list for South Carolina.

To be enjoyed at leisure and for sheer delight are the numerous line drawings by John Henry Dick. The artist truly makes the Low Country come alive. One can almost feel the air rush by when looking at the pictured flights of big birds across the salt marshes. Turkeys feeding under a live oak are so realistic that the reader expects them to fly to the topmost branches as the pages are turned. Drawings of great houses as well as that of a Low Country cabin stir a nostalgia for an era long gone. Yet this volume leaves the impression that great beauty and romance are still to be found in the Carolina Low Country.

JUNE RAINSFORD HENDERSON
Aiken, South Carolina

CHARLES DARWIN. de Beer, Gavin, Sir. 290 pages, illustrated, indexed. Doubleday & Company, Inc., New York. 1964. $4.95.

There is an apt story about a political orator who said he would need a month to prepare a five-minute speech, and a week for a one-hour speech, but could start immediately if he could speak as long as he liked. Sir Gavin de Beer, an eminent biologist and a long-time Darwin buff, has condensed into less than three hundred pages all that the nonspecialist needs to know about Darwin and the impact of his work on biological and geological thought. The author's "aim has been to ensure that the biographical treatment was sufficient to situate Darwin in his period and his circumstances, but that the emphasis should be on his scientific achievements without going into the minutiae of his private life."

A fact new to the reviewer is that Darwin's permanent ill health, after the voyage of the "Beagle," was probably due to chronic trypanosomiasis—Chagas' disease—contracted as a result of being bitten in South America by the "kissing bug," *Triatoma infestans*. Darwin's encounter with the insect is vividly described in his journal, and from his own account he could not have avoided becoming infected. The "symptoms caused by Chagas's disease can be matched, detail for detail, with Darwin's medical history" from that point on.

The author has a clear, unpretentious style well adapted to catch and hold the interest of the general reader. The book can be recommended to all whose reading interest extends beyond the works of Edgar Guest and Mickey Spillane.

ARTHUR CRONQUIST

THE CITY GARDENER. Truex, Philip. 344 pages. illustrated, indexed. Alfred Knopf, New York. 1964. $6.95.

It takes someone who has come to his first knowledge and love of plants in a city to do the most effective job of writing about them. Mr. Truex is such a person. He was urban born, and one of the most significant statements in his excellent book is that he "discovered nature" on a roof terrace in New York City—recently described as the terminus of a three-thousand mile sewer of air pollution components. The teeming millions who live in sky deserts, and their fellow millions whose dooryard plots are at the bottom of a canyon, have received shamefully scant attention by garden writers, and that often of a patronizing nature. Yet this is a wonderfully interesting field for those who will emulate Mr. Truex' approach. For instance, in commending *Yucca filamentosa* as a tub perennial, he says: "It occurred to me, after seeing the giant *Yucca arborescens* blooming so majestically in the dry and barren hills of southern California, that yucca should find a roof garden to its liking."

Parts I and II are for roof and backyard gardeners respectively; Part III is a concise almanac. The text is lavishly illustrated with photographs, plans, diagrams, and attractive drawings.

NANCY GRASBY
New York, N. Y.

THE ADVANCE OF THE FUNGI. Large, E. C. 488 pages, illustrated, indexed. Dover Publications, Inc., N. Y. 1962. Paper $2.25.

This is a reprint of the book first published in 1940. It is one of the most fascinating books ever written about man's struggle with fungi which cause plant and animal diseases. Dr. Large has the unusual ability of writing dramatically of technical and scientific discoveries. Step by step he relates man's battle against parasitic fungi from the year (1845) of the great famine in Europe caused by potato blight up to 1940. Diseases, such as grape mildew, bunt of wheat, stem rust of wheat, grape phylloxera, fish mold, club root, anthrax, coffee rust, and so on, are covered in exciting chapters. Interspersed with these, in historical sequence, Dr. Large tells of the discoveries of the great mycologists and bacteriologists and of their studies and experiments which form the foundations of the sciences of bacteriology, mycology, and plant pathology. This is a book which anyone interested in agriculture, botany, biology, or gardening, will find enjoyable and worthwhile.

CLARK T. ROGERSON

ADVANCES IN MARINE BIOLOGY, Vol. 1. Russell, F. S. (ed.) XIII + 410 pages, illustrated, indexed. Academic Press, Inc., London and New York. 1963. $13.50.

It is the expressed purpose of this serial publication "to help biologists keep abreast of knowledge in the different lines of research on the biology of marine organisms."

The first volume in this series contains five review articles weighted heavily toward the animal kingdom: rearing of bivalve mollusks, breeding of North Atlantic freshwater-eels, some aspects of photoreception and vision in fishes, behavior and physiology of herring and other clupeids. Of particular interest is the article reviewing the biology of coral reefs. The individual articles are well written and have consistent formats.

Since the literature of marine biology is so widely scattered in space as well as time, it is of great advantage to have compilations of more recent developments. The fact that animals are treated in great detail in the first volume of the series should incite the marine botanist to greater action and also make him aware that marine biology still is a field where a contribution can be made by the generally trained biologist.

M. H. LEVIN

THE FLOWERING PROCESS. Salisbury, Frank B. xii + 234 pp. illustrated, indexed. The Pergamon Press, N. Y. 1963. $7.00.

The volume under consideration is volume 4 in the Pergamon Series in plant physiology. It is a welcome addition to a growing number of monographs for advanced students. The concept of small volumes on restricted topics seems much more sensible than the monstrous collective volumes of unrelated topics favored by some publishers.

Professor Salisbury is one of the more productive scientists in the field of plant photobiology and is eminently suitable to prepare the book. The volume successfully presents his knowledge. It is a very personal book which is in itself a useful teaching device. The figures are excellent, the printing is good, and the volume is both attractive and valuable.

It is inevitable that the book by Salisbury will be compared with Dr. William Hillman's book on *The Flowering of Plants*. Both books stand up well, with Dr. Hillman's book being more useful for the professional and Dr. Salisbury's more suitable for students and, with a bit of hard digging, for amateurs with some botanical background.

RICHARD M. KLEIN

THE FORMATION OF WOOD IN FOREST TREES. Zimmermann, M. H. (ed.). xv + 562 pp., illust. Academic Press, N. Y. 1964. $16.00.

The volume consists of the proceedings of the second symposium held under the auspices of the Marie Moors Cabot Foundation for Botanical Research. The meetings were held in April, 1963, at the Harvard Forest.

The volume consists of twenty-nine chapters by specialists in one or another aspect of wood formation and function. The gross, microscopic, fine-structural details of the form and formation of woody cells, their biochemistry, biosynthesis, function, and environmental control are discussed in terms of recent research.

The volume is well edited, scientifically important, gratifyingly prompt, and grossly overpriced. It will, however, be of immediate use to workers in the applicable fields of structure, function, and ecology.

RICHARD M. KLEIN

ANNUAL REVIEW OF PHYTOPATHOLOGY. Horsfall, J. G. (ed.). 469 pages, indexed. Annual Reviews, Inc., Palo Alto, Calif. 1963. $8.50.

A long-felt need has finally been realized with the publication of the first annual review in the field of plant diseases. The editorial committee, headed by Dr. J. G. Horsfall, is to be commended for its selection of subjects and authors in this most important discipline. The first volume readily fulfills the hopes of the editorial board that it serves as "a stimulating vehicle for encouraging new research, imaginative research." I predict a long, bright, and productive future for this publication.

P. P. PIRONE

FRUIT: A review of production and trade relating to fresh, canned, frozen and dried fruit, fruit juices and wine. Anonymous. Compiled in the Intelligence Branch of the Commonwealth Economic Committee. iv + 223 pages. Her Majesty's Stationery Office, London. 1963. $2.00.

This is a statisical survey of production and so forth of fruit in the world, with special emphasis on the United Kingdom for the years 1961-62. For anyone needing world statistics on various kinds and quantities of fruits which enter world trade, this is a useful, though very dry, compendium.

DAVID J. ROGERS

VISTAS IN BOTANY. Vol. 3. Recent Researches in Plant Physiology. W. B. Turrill, (ed). x + 316 pages, illustrated, indexed. Pergamon Press, N. Y. 1964. $15.00.

The volume under consideration consists of a series of review papers in special fields of plant physiology. The authors are all recognized specialists in their respective fields, the reviews are comprehensive, up-to-date, and of considerable utility to the professional plant physiologist.

I have, however, complaints about the concept of the series. In the first place, this volume, and the others in the series, are grossly overpriced when one considers that the half-life of any individual article in the series is about eight months. In the second place, the articles in any volume are merely a collection with absolutely no integration among subjects, and this does not facilitate the "vista" which has so cleverly been inserted in the title. Surely there are sufficient high-level periodicals and "series" without adding new ones.

RICHARD M. KLEIN

SUGAR-CANE DISEASES OF THE WORLD: Vol. II. Hughes, G. C., E. V. Abbott, and C. A. Wismer. 354 pages, illustrated, indexed. American Elsevier Publishing Co., N. Y. 1964. $21.75.

Volume II completes the most comprehensive presentation of sugar-cane diseases ever published. As with the first volume, the diseases are considered on the basis of causal organisms—bacteria, fungi, and viruses. Chapters on nutrient deficiencies and toxicities, hereditary and nontransmissible effects, and nematodes follow.

Experts from many of the sugar-cane producing areas of the world are contributors. To make the book even more useful, a summary of each chapter is printed in Spanish. The book is printed on the finest stock; the illustrations—line drawings, half-tones and color—are excellent.

P. P. PIRONE

VEGETATION AND FLORA OF THE SONORAN DESERT. Shreve, Forrest and Ira L. Wiggins. 2 volumes, 1740 pages, illustrated, indexed. Stanford University Press, California. 1964. $22.50.

The first part (188 pages) of this massive work is taken up by a second printing of the late Forrest Shreve's *Vegetation of the Sonoran Desert*, out of print almost from the time of its initial appearance in 1951. A few of the photographs are new, but otherwise Shreve's treatment remains unchanged and includes the original interesting foreword by H. A. Spoer. The second part, unillustrated and occupying most of Volume 1 and all of Volume 2, is Ira Wiggins' long-awaited *Flora of the Sonoran Desert*.

Certainly the most laudible feature of the two works is their treatment of a natural phytogeographic area—the only one of North America's four deserts with littoral borders—without respect to political boundaries. The authors' involvement with the region and its plants spans a period of more than thirty-five years.

Shreve's contribution, as originally published, represented the first in a series of works originally planned to deal with the plant ecology and floristics of the Chihuahuan and Sonoran deserts. To investigate the floristic aspects Shreve enlisted as collaborators the late I. M. Johnston in the Chihuahuan area, and Wiggins in the Sonoran. With only one of the trio surviving, it is indeed remarkable that so ambitious a compass has reached the present level of fruition.

One of the most formidable problems to be faced in working up a flora of any magnitude is the determination of a "cut-off" point, a time or a level of investigation beyond which ever recurrent problems must be left unresolved. Inevitably an author must accept compromise between the pressures of completing the job and investigating problems as fully as possible. In view of the fact that three decades is not a surprising expanse of time for so large an undertaking, it appears that Wiggins balanced

these pressures satisfactorily. Recent monographs and revisions have been followed to a considerable extent and a number of genera and families have been worked up by invited specialists. A small number of taxa are new.

As a student of the *Leguminosae,* I have studied the treatment of this family (here treated as three separate families) rather closely and am led to the conclusion that while Wiggins' taxa are clear enough, the level of recognition chosen is not always consistent. Overall, there seems to be a proliferation of small genera which, in the *Leguminosae* at least, tends to be rseisted by most present workers. For example, the segregation of *Hosackia* from *Lotus* may seem clear-cut (stipules reduced to glands in the former) in the Sonoran region, but in California there are species with intermediate stipule development. Similarly, while there are good grounds for distinguishing *Errazurizia* from *Dalea,* the same can hardly be said for the separate treatment of *Thornbera* or *Petalostemon. Sphinctospermum* may appear removed from *Tephrosia* and *Chamaecrista* from *Cassia* within the Sonoran province, but such segregations are unsound, when each of the larger genera is regarded in its total range of expression.

As might be expected, there are a few flaws of correlation between the two works. As an example, Shreve lists *Cassia confinis* as a component of Baja California's winter ephemeral vegetation, while Wiggins characterizes this species as a herbaceous or suffrutescent perennial.

Taken in perspective, these faults are of no great consequence. The two volumes are a valuable source of information contributing to the understanding of the complex vegetation of the Sonoran desert and its surprisingly complex floristic components.

HOWARD S. IRWIN

TIMBER AND MEN. THE WEYERHAEUSER STORY. Hidy, Ralph W., Frank Ernest Hill, Allan Nevins. 704 pages, illustrated, indexed. The Macmillan Company, New York. 1963. $8.95.

This book is largely the history of the timber industry in the United States as illustrated by examples mostly from the Weyerhaeuser family and the Weyerhaeuser Lumber Company. It has chapters on the men involved in the development of the lumber industry since about 1850. It covers the historical development of methods for planting and replanting, of lumber machinery, of marketing, of the changing emphasis of employment in the industry, etc.

DAVID J. ROGERS

CELL STRUCTURE AND FUNCTION. Loewy, Ariel G., and Philip Liebevitz. Modern Biology Series. 228 pages, illustrated, indexed. Holt, Rinehard and Winston, Inc., New York. 1963. $2.25.

The purpose of this book is to acquaint the beginning student with basic biological principles of living systems, as well as introducing the current information available on cell function, cell chemistry, agents of biological specificity, mechanisms of biological control, the transmission of information, and the development and control of cell structure and function.

The book, written in a concise and clear style, is informative enough to serve the introductory student and as a guide for an elementary course in cell biology.

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BOTANIC GARDEN STRESSES RESEARCH
(Continued from page 92)

Maguire, Head Curator and Coordinator of Tropical Botany, to collect specimens in the South American jungles, to the microflora studies of Dr. Marjorie Anchel in search of new antibiotics.

The research program began almost as soon as the garden was established in 1891 and started amassing its three million specimens of flowering and nonflowering plants, its forty thousand horticultural varieties, its thirty thousand plant fossils, and its thirty-five hundred specimens of fungi and microorganisms, its five thousand species of living plants on the grounds and in the greenhouses, and its library of sixty-five thousand bound volumes on botany and horticulture and three hundred thousand reprints, catalogues, and papers on botany and horticulture.

Today the garden has thirty-eight Ph.D.'s, in addition to many highly trained assistants, some of whom work in the administration building while others do their research in a two-story brick and glass laboratory. This building, built at a cost of $1 million, was opened in 1956 and contains thirty-two laboratory units in its 22,600 square feet of floor space.

The garden is a privately endowed, nonprofit corporation chartered by the state in 1891. Its first director, Dr. Nathaniel Lord Britton, Professor of Botany at Columbia University, was named in 1895. The original corporation members were private citizens who financed the organization. The city donated the land, which is just north of the Bronx Zoo.

Most of the money for gardening, the maintenance of buildings and grounds, and building new roads is appropriated by the city. Most of the money for the plantings, scientific research, and an educational program is paid for by private endowment, contributions from various sources, and memberships.

CHURCH GARDENS
(Continued from page 88)

to select those shrubs which grow easily in the area, the only maintenance will be pruning. Some plants grow very fast and require pruning yearly, but there are others which grow slowly and develop into mature specimens with little or no pruning. Box, rhododendron, pyracantha, crape-myrtle, or oleander form a pleasing green background to an enclosure and do not need constant attention. If shade is not necessary, being provided by the walls of the church, a tree, such as a cedar or a mountain-ash, with a vertical outline will balance the many horizontal elements.

The seating facilities must be weatherproof and permanently fixed, as there is usually no room for winter storage. Besides, their arrangement will give form and substance to the garden as a chapel. The altar can be sheltered, if desired, although many altars have weathered all climates on the roads of Europe, and modern science has devised many materials which withstand the elements. There are some outdoor chapels in the New York area but only a few are enclosed and give privacy for prayer. Some are large enough to seat fifty or more people. Size, however, is not important. What is important is an atmosphere of tranquility.

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And yet the fool contends that God is not.
Not god in gardens when the ev'n is cool?
Ah! but I have a sign. Tis very sure
God walks in mine."

NEWS AND NOTES (Continued from page 113)

A Comprehensive Exhibition of Contemporary Botanical Art and Illustration opened April 6 in the Hunt Botanical Library at Carnegie Institute of Technology, Pittsburgh, and will continue through August 21, 1964. The exhibition consists of about 240 original works by 72 artists, 63 of whom are American. Others are from England, Switzerland, Spain, and South Africa.

The majority of the works are water colors or pen-and-ink drawings, but there are also colored woodcuts, wood engravings, lithographs, serigraphs, and linoleum cuts. Of particular interest are a group of linoleum cuts by a West Coast artist who achieves a delicacy seldom found in this medium.

The Hunt Botanical Library contains one of the world's great collections of rare botanical books and paintings, the collection of the late Mrs. Roy A. Hunt who, with her husband, donated the Hunt Library to Carnegie Tech in 1961. Dr. George H. M. Lawrence, Director of the Hunt Botanical Library, has explained that because of the excellence of the collection up to 1850, it has been decided to concentrate on the botanical art and illustration being produced today. The collection will some day be of immense value to scholars, artists, and other interested persons. A catalog, including biographical information on the artists, will be available.

Bonanza F_1 Hybrid Zinnia (upper left) with its parents. Developed by Burpee Seeds and winner of the All-America Silver Medal in 1964, this zinnia has double, ruffled and quilled, light golden-orange blooms up to six inches across.

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Ilex crenata **'Sentinel'** was registered in April, 1963, with the Holly Society of America, Inc., at Rutgers - The State University, New Brunswick, New Jersey, by its hybridizer, Norman H. Cannon of Greenwood, Delaware. It is to be introduced next spring, 1965.

This holly, an upright grower, is easily trained to a single central stem. It will become a pyramidal plant without being sheared; but shearing, when the plant reaches three feet high, is recommended to encourage thick growth. The leaves are convex with rounded apex and shining dark green. The berries are produced freely. It is a good subject for a tall, narrow hedge.

'Sentinel' was selected from among more than five thousand seedlings. The mother plant was *Ilex convexus*. Pollen was not controlled except by limiting nearby plants to *I. rotundifolia*, *I. macrophylla*, and 'Green Island.' It is believed that pollen from *I. macrophylla* produced this hybrid. The original 'Sentinel' seedling is now nine growing-years old, six and a half feet tall, and thirty-six inches wide at the base. The leader was tipped out when the plant was seven years old. For three years no plant food, no spray material, and no winter protection was provided. 'Sentinel' proved itself to possess mite-resistance, cold-hardiness, and a fine root system.

The American Rose Society has announced the appointment of Keister Evans, Jr., as Executive Secretary-Editor, effective April 1, 1964.

Mr. Evans, a native of Pittsylvania County, Virginia, was graduated from Virginia Polytechnic Institute in Blacksburg, in June, 1961, with a B.S. degree in agricultural education. Since then he has been employed by the Virginia Polytechnic Institute Cooperative Extension Service, being promoted to agricultural agent in eighteen months, a promotion which is not usually achieved under three years. He was the youngest agricultural agent in the state and was located in Newport News, Virginia, one of the fastest growing regions.

Katsura Tree for Light Shade. If you are looking for a handsome foliaged tree which gives light filtered shade, consider the Katsura-tree *(Cercidiphyllum japonicum)* suggests Walter Haldeman of the Correspondence Course Department at The Pennsylvania State University. The Katsura, a tree native to Japan, grows rapidly to a mature height of fifty to sixty feet. Sometimes it grows with several main stems or trunks, as do birches. The heart-shaped leaves have a purplish cast as they unfold in early spring. Then, as summer approaches, they

turn a bright green and finally a yellow to scarlet color in autumn. The tree is well suited as an ornamental for several other reasons. It is practically free from disease and insect pests, and it is able to withstand even the coldest winter—in fact, the Katsura-tree is hardy as far north as southern Canada.

It gets along with other plants, too. The roots of the tree penetrate deeply into the soil, thus avoiding competition with surrounding shrubs, flowers, and lawn for water and fertilizer.

You can learn more about this and other interesting trees for your landscape by enrolling in the Penn State correspondence course. Send your name, address, and one dollar and twenty-five cents to "TREES," Box 5000, University Park, Pennsylvania.

Holly Society Sponsors New Check List. Holly culture since World War II has made remarkable strides. Hundreds of growers, finding the item in demand, have even introduced their own varieties. Landscape designers and home gardeners have a right to be bewildered over the many varieties available today. To simplify this state of affairs, the Holly Society of America is supporting the project of compiling a directory of all names applied to hollies.

The project of assembling accurate information and checking sources will require two years, according to Jackson M. Batchelor, Holly Society President. Already the card file contains more than one thousand names; this number represents an increase of one hundred and fifty above the out-of-print list published by the Holly Society in 1953.

Work is progressing along three fronts—at the United States National Arboretum in Washington, D. C., at the Bailey Hortorium at Cornell University, Ithaca, New York, and at the Massachusetts Horticultural Society in Boston. The extensive nursery catalogue files of these horticultural centers are being subjected to careful scrutiny for historical data on holly culture from Colonial times to the present day.

Aside from the half dozen imported varieties of the "evergreen European holly" *(Ilex aquifolium)*, the first holly variety offered in this country seems to be the littleleaf Japanese holly, *Ilex crenata microphylla,* listed by Parsons' Kissena Nurseries of Flushing "near New York," in the 1880's. A fine hedge of this variety, planted at about that time, is still to be seen at Rohallion, the home of Dr. and Mrs. A. J. Pisani of Rumson, New Jersey.

Nurserymen who have introduced new holly varieties into commerce are urged to notify Robert B. Clark, Bailey Hortorium, 467 Albert R. Mann Hall, Cornell University, Ithaca, New York 14850, so that their holly introductions may be correctly reported in the new check list. This list will benefit nurserymen and plant buyers because it will be an authoritative, alphabetical directory of hollies as well as a listing of nurseries which originate, introduce, and grow hollies. Dr. Clark is the Vice Chairman of the Committee on the Holly Check List.

MEMBERSHIP

We were delighted to welcome the following new members between October 31, 1963 and March 31, 1964.

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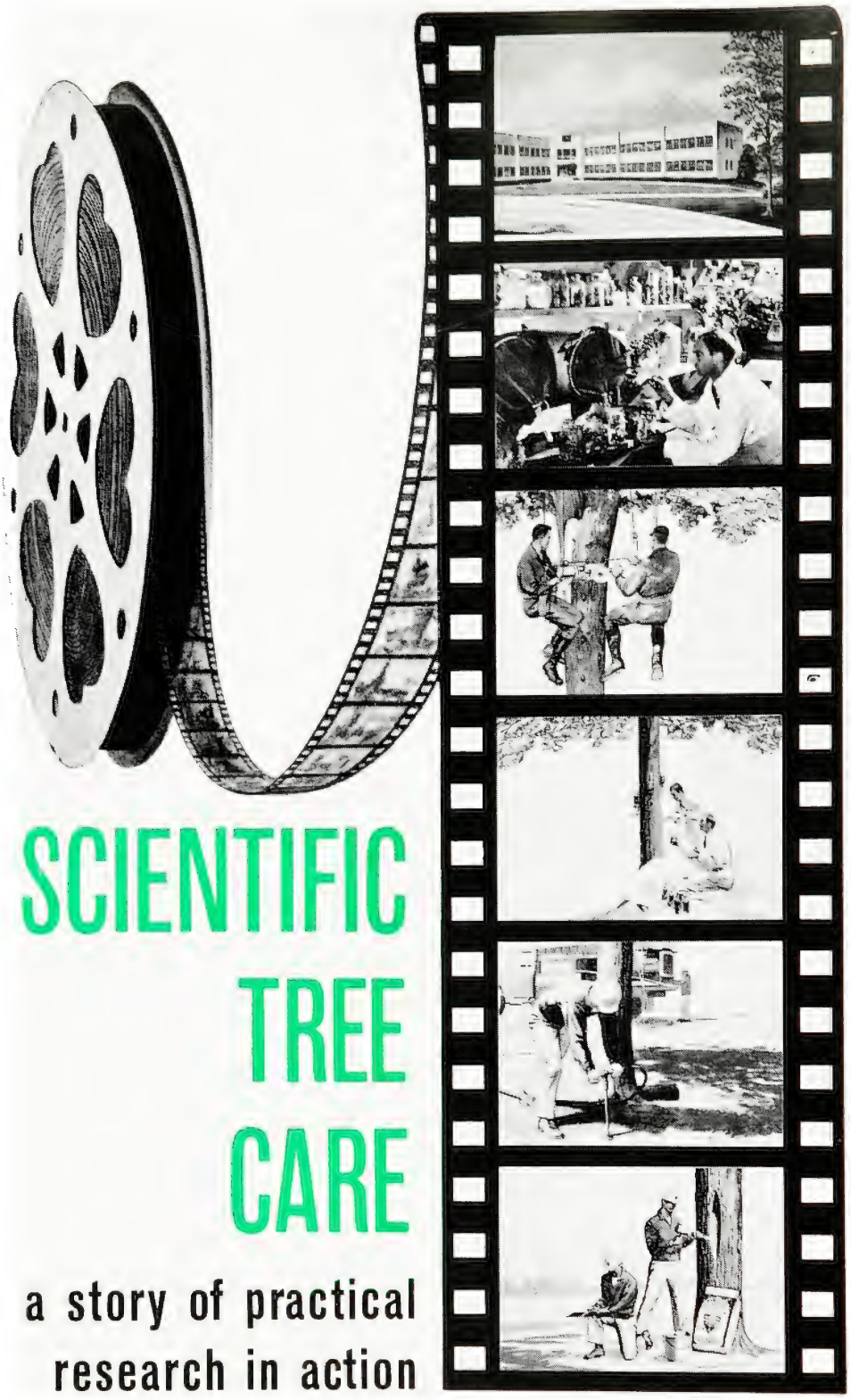

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THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

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THE GARDEN JOURNAL

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Front-cover illustration, the "Lost World" pitcher plant, *Heliamphora tatei*, by Bassett Maguire; pp. 122, 123, Charles C. Clare, Jr.; pp. 124-127, 128 left, 129, 131 Bassett Maguire; p. 128 right, Kathleen D. Phelps; pp. 135-139, Howard S. Irwin; p. 142, Lincoln Adderley; p. 143, M. L. Solt; pp. 144-146, J. J. Wurdack; p. 147, Walter Singer; pp. 151-154, Arthur W. Ambler; p. 156, Walter Singer; p. 157, H. W. Rickett; p. 158, Walter Singer; p. 159, T. H. Everett; pp. 162-164, Walter Singer.

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IT'S A PEACH!

By LUCIA M. ANDREWS

Mrs. Andrews, who was a student in Botany I and II under Dr. H. W. Rickett at The New York Botanical Garden and in other courses in the Garden's Educational Program, continued her studies and received a Master's degree from Columbia University under Dr. Bassett Maguire. She is now engaged in writing on botanical topics.

A PEACH lies on your summer breakfast table—its downy cheeks flushed with pink and yellow, its fragrance so inviting, its soft flesh luring you to eat. This delectable fruit is one of our oldest cultivated plants whose history has been intertwined for four thousand years with the long story of civilized man.

Before the days of fire or metal, in the haze of human beginnings, prehistoric man hunted small animals and killed fish, while his woman gathered fruits and roots of native plants for the family food. It was probably a naked female of a wild human tribe who first collected peaches in the high forests of central China. What she found were small, yellowish fruits consisting almost entirely of a deeply corrugated pit, covered with a thin layer of sour-tasting flesh and hairy skin. Such wild peaches are still growing on the mountainsides of China, and although they are glorious in the spring, covered with multitudes of shell-pink flowers, their mean fruits are considered worthless by the present local populations.

On the day that the primitive Stone Age woman scratched the surface of the ground with her pointed stick and planted a peach stone near the entrance of her cave, cultivated peaches were born.

The earliest records of agriculture come from China which was singularly fitted to be a cradle of civilization. The rich soil of fertile valleys and great alluvial plains; the favorable climate and adequate rainfall; the desirable native plants in a wealth of varieties within easy reach; all these conditions were present in China. When hunting and fishing failed, man turned to agriculture for food, though he has always preferred stalking game to working the ground, and in primitive cultures has left the women to do most of the dull digging and harvesting.

Far down the dwindling perspective of history, as far back as 2700 B.C., a half-legendary Emperor, Chen Ming, instituted ceremonies for the sowing and reaping of crops. Thousands of years had intervened and many steps forward had been taken by developing man, between the obscure beginnings of agriculture and the regular cultivation of crops.

During this long interval, reacting to selection by man, the sour, stony, wild peaches gradually became the succulent fruit we know today. They were not only a great delicacy—food fit for emperors—but they had attained symbolic values and magic powers. If one ate peaches, one would live forever, or if, unfortunately, the eating came too late, one's body would be preserved until the end of the world. The peach, as a symbol of longevity, appears in ornaments of painting and sculpture and frequently was offered for congratulatory gifts. The Han emperors, building a cult of their own immortality, found the peach legends useful.

Another quite different set of ideas developed around the peach. As the plum flower was the symbol of chastity in women, the pink peach flower represented the exact opposite. Proper ladies shunned anything which was colored pink, and peach trees were never planted near the bedrooms or in the courtyards of women, lest they develop a "peach flower heart" and become untrustworthy wives.

Wands made from peach twigs could beat off all evil spirits, but these wands must be plucked during a solar eclipse and fashioned during an eclipse of the moon. Since during either eclipse, everyone was very busy beating drums to drive off the heavenly dogs which were consuming the sun or the moon, it is extremely doubtful if many authentic peach wands actually existed. However, especially fine prayer beads were carved from peach stones—there seems to be no movement of the heavenly bodies necessary to the making of these artifacts.

Restless man has always traveled—to find better hunting and fishing, pasturing or farming, or to trade with his neighbors. Wherever he has moved he has taken seeds of his favorite plants on his journeys. It is fair to imagine a grimy saddlebag, heavy with peach pits, thrown across the back of a long-haired Mongolian pony, led by a swarthy, fur-clad trader. Small bands of such men and animals, gathered together for safety, formed the first caravans. They fought their way through high mountain passes, across flooding rivers and barren deserts, from China to Kashmir and Persia, before written history begins.

Some seeds were lost on the way, and those that fell on good ground fathered new populations of peaches, but it was in Persia that peaches "went native." During hundreds of years, many varieties developed in different environments. The peach spreads so easily in countries in which it becomes naturalized that it is hard to say whether a given tree is native or has deteriorated from one introduced long before.

It is probable that peaches were brought from Persia to Greece by Alexander's armies. In 332 B.C., Theophrastus, a student of Aristotle and known as the "Father of Botany," mentions them in his list of plants.

Virgil, the great Roman poet, wrote during the first century B.C.,

> "Myself will search the planted grounds at home
> For downy peaches and the glossy plum."

Peaches in Rome were a highly prized dessert fruit, gracing the banquet tables of the rich. Pliny says a single peach cost thirty sesterces—equal to $1.35—so Virgil was sensible to grow his own!

The Romans gave the peach the name that has identified it ever since, and has also perpetuated a mistaken idea—*Prunus persica.* The Romans and Greeks had received their peaches from Persia and knew of no other source so the name was a natural one.

Persia was generally accepted as their place of origin until 1882, when Alphonse deCandolle published his research. DeCandolle was a botanical detective. He delved into archeology, history, and ancient languages as well as botany, and merged the facts and legends from all sources to propose the probable origin of cultivated plants in his classic book of that name. All that has been learned since deCandolle's time has corroborated his theory that peaches originated in China, not in Persia.

During the Middle Ages, peaches were cultivated by monks in monastery gardens and gradually disseminated throughout Europe with the spread of Christianity.

Always journeying along with man, peaches took the long voyage across the ocean to the New World in the galleons of the Spanish conquerors. By 1571, three different types of *P. persica* were established in Mexico. The French planted peaches in Louisiana. The English brought them to Jamestown and the Massachusetts Bay colonies. The Indians were quick to appreciate the delicious new fruit, and they carried them into the inland wilderness. The peaches adapted so well to their new homes in the New World, multiplied and developed new types—more than a thousand sorts have originated in America—that some specialists have mistakingly thought that the "Indian peaches" of our southern forests were truly native on this continent.

Few other fruits grow under such varied conditions and over such a wide range. Peaches, both wild and cultivated, spread over much of Japan, all of China. They are at home and abundant in the Middle East as far north as Vladivostock. They thrive around the Mediterranean and on the islands of the Atlantic and Pacific. The white race carried them across the equator to the gardens and orchards of South Africa. They are important in the horticulture of temperate South America, Australia, and New Zealand. In colder countries, England and northern Europe, peaches are cherished against protecting walls or cared for as greenhouse plants.

Its great range proves that *P. persica* is a species full of flexibility, able to adapt to vastly differing environments. Peaches can be round, flat, or beaked in shape; their flesh can be red, yellow, or white in color, free of the stone or clinging to it; their skin can be downy or smooth; and they can have a sweet, sour, or bitter taste. Many combinations of these characters are found in an uncounted number of varieties, and man through the centuries has selected the plants which pleased him.

One of the longest known and cultivated variations is the nectarine, which is indistinguishable from the peach except for its smooth skin. This is a heritable mutation, carried in the genes. Some peach seeds will grow into nectarines, and some peach trees will bear both peaches and nectarines.

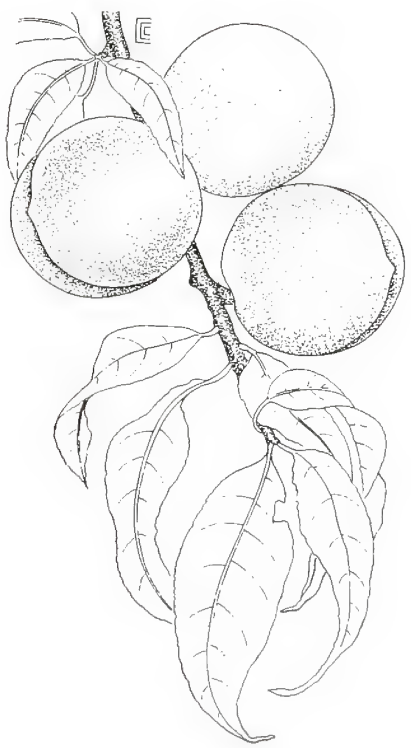
Yet with all this variability *P. persica* is a stable and recognizable species. There is a universal stamp which marks peach trees everywhere in spite of the many differences between them. Even today a poor seedling of a cultivated variety will vary little from the seedling of a wild tree.

In colonial America, the peach belonged to the common man. It grew easily in home gardens and was beautiful in bloom and useful in fruit. The impetus for fruit growing on a large scale, during this period, was not the demand for delicate eating but the urge for strong drink to warm the hearts and bodies of the hardy settlers. Peaches were grown in quantity for peach cider, a sort of vinegar, and for peach brandy, a distilled liquor.

Peter Kalm, the distinguished Swedish botanist and pupil of Linneaus, traveled and collected plants in the colonies in the late eighteenth century. He wrote of the making of peach brandy and concluded, "This brandy is not for people who have a more refined taste, but it is only for the common kind of people, such as workmen and the like." The peach was still contributing to man's pleasure, though in a different way.

Today, in North America, where the peach is second only to the apple in importance among our deciduous fruits, seventy-five percent of the world's crop is produced. Our fine varieties have been constantly selected from superior seedlings and propagated by budding and grafting. California heads the list of states, with Georgia second and New York third. In the United States, producing, shipping, and canning peaches is a multimillion-dollar industry.

So the history of the peach has been part of the history of man, through various stages of development, across vast distances from continent to continent around the world. Through thousands of years, man's care and culture, coupled with its own rich genetic endowment, have brought the peach to us in its present perfection.



TWO DECADES OF EXPLORATION IN THE AMERICAN TROPICS

By BASSETT MAGUIRE

Dr. Maguire is Head Curator and Coordinator of Tropical Research at The New York Botanical Garden.

SINCE ITS INCEPTION, exploration has been a trademark of The New York Botanical Garden. But because of the particular quality and personality of botanists, field activity has been more concentrated during certain periods than in others. Contemporary time, embracing the past two and coming decades, is one of prominent activity in the field of exploration. Since exploration is programatically organized and is now "big business," it seems appropriate to pause at this interphase to look back upon the past twenty years and to cast our eyes ahead in anticipation of the twenty years to come.

Exploration has held my primary interest and absorbed my primary energy for more than twenty years. I do not mean to suggest here that the resulting activity has been wholly or chiefly of a personal accomplishment. It is, rather, a group activity, an institutional program upon which I report.

The New York Botanical Garden and the too few other institutions like it are charged with the responsibility for the building, the careful organization, and the administration of vast collections which represent so far as possible the kinds, quantity, quality, geography, and usefulness of plants which compose the vegetation of the earth. The plant specimens, nearly three million in the Garden's herbaria, together with accompanying data form the physical basis upon which rests so much of the studies relating to the preparation of taxonomic monographs, the writing of floras, the investigation into ecology, morphology and structure, the projection of geography, and the speculation as to evolution itself. All of these disciplines are continuously updated to reflect changing techniques.

The assemblage of so vast a collection has obviously involved the work of many hundreds of men and women who have labored over more than a century. Among the early specimens at New York are plants collected in the initial western exploration of the United States, which came to us through the hands of John Torrey, early professor of botany at Columbia University. Our contemporary work also involves many people and many hands, and a rather strongly coordinated organization of their efforts. In this report the work and the imagination of all are reflected.

To see contemporary activity in proper perspective, it is instructive to lay it in the framework of historical activities at the Garden.

Traditionally, The New York Botanical Garden has had a long-established and pre-eminent history in exploration. The successive generations of taxonomists, including the first and the now incumbent Director, have all been promi-

Guiana rain forest, Saramacca River, Suriname, typical meander of river in low-altitude coastal areas. Note mosaic pattern of tree crowns and sharp delimitation of forest wall at riverside.

One of the scenic spectacles of the Western Hemisphere, Kaieteur Falls, dropping 841 feet over the sandstone eastern periphery of the Guayana Highland. The gorge and natural savannas are the homes of many rare and beautiful plants.

nent field men who have contributed strongly to the descriptive floristic literature of the Western Hemisphere.

Some years ago Dr. H. A. Gleason prepared a list of explorations conducted by The New York Botanical Garden, from 1897 to 1946, reporting some 248 expeditions, extensive and restricted, which had been sent out to all continents of the globe. The greater number of field excursions, 103, were conducted in North America. Reflecting Britton's own personal interest, ninety-two expeditions were sent to the West Indies. Continental South America took third place with twenty-seven field excursions. The remaining explorations were nearly equally divided among explorations in Asia, the East Indies, Pacifica, and Africa. Truly an impressive tradition set guide lines for the future.

Even so from time to time programs and procedures need to be reexamined. Thus a report of this sort should answer the always pervading questions of justification — what, where, how, and why has the work been done and is to be done. I shall attempt to respond to these questions.

WHAT. With tradition forming so much a part of the history of exploration at the Botanical Garden, it is not surprising that intensive field activity has been maintained through the past two decades. During this contemporary time, field activity has centered chiefly in three areas: the intermontane and northwestern United States, Arctic North America, and continental South America. Dr. Cronquist and his associates are preoccupied with the temporate flora of western America. Dr. Steere and his associates have given much attention to the bryophyte flora of Arctic America and earlier to the region of the Andes. In our immediate concern with South American exploration, the Garden and associates have conducted some eighty explorations since 1944. That would average four a year.

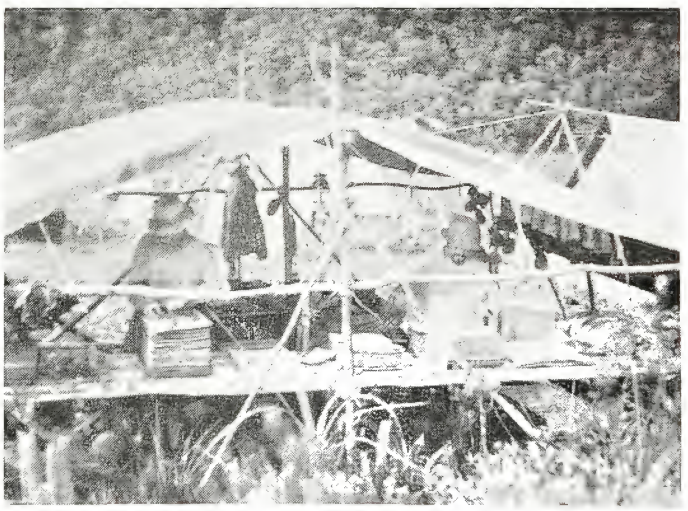
Our records show that somewhat in excess of 35,800 field numbers, totaling some three hundred thousand specimens, have been obtained in the tropical program. More than twenty-two principals have been involved in their collection, of whom John J. Wurdack, Richard S. Cowan, Julian Steyermark. Howard Irwin, and our Brazilian colleagues, João Murça Pires and the late Walter Egler, have been the more prominent. We have taken with us seven graduate students, of whom Wurdack and Cowan were the first; the last, Noel Holmgren, is presently carrying on graduate study at the Garden. I have conducted or participated directly in forty-eight of these expeditions.

In their conduct, travel requirement has been great. This has involved perhaps a hundred voyages at sea, going and coming, on which personnel, gear, and equipment have been taken to the field and have returned with the precious cargo of collections to New York. Many companies have contributed to this transport.

Considerably fewer times have we gone to South America by plane, because we cannot carry field gear with us or return collected materials inexpensively by air transport. However, in the field itself we have used air transport ex-

On the Venezuelan side of Ilu-tepuí, Arecuna Indians have signaled their approach to a village. Habitual burning of this sort since pre-Columbian time has pauperized and extended the savannas of the Gran Sabana.

Efficiency of working facilities and personal comfort are of prime importance in camps on extended expeditions. Louis Politi and the author are preparing plants in a well-constructed laboratory on the summit of Cerro Sipapo, Amazonas, Venezuela.



A classic example of the tabuliform mountains of the "Lost World," Huachamacari, the Maquiritari, "House of the Gods," from the native village of Culebra in Amazonas, Venezuela.
The arrow above the escarpment points to the cliff face seen in the lower photograph, taken from a distance of five hundred yards.

Below. The vertical face of Huachamacari, taken from the escarpment edge at six thousand feet. The montane forest is three thousand feet below.

tensively. For example, for the last exploration of the Wilhelmina Mountains in central Suriname completed only this past October, we employed eleven chartered DC-3 flights. For our overall work, the total flying distance traveled must have been greater than that achieved at sea.

Since there are few roads in the interior of the rain-forest area of South America, the chief avenues and highways leading to the approaches of the final objectives of exploration are the great rivers. On this past Wilhelmina expedition we employed nine large dugouts with built-up board siding, powered by eighteen-horse-power Johnson motors, each capable of carrying a load of a ton and a half. From the interior landing and staging field in southern Suriname on the Lucie River to the river base camp at the foot of the Wilhelminas was a distance of some one hundred miles. Our boats and motors for a greater part of the five months of the expedition continuously ran in relay between these points. In interior Venezuela in the Alto Orinoco, direct water distances were often as much as a thousand miles. On one expedition on the Alto Orinoco occupying seven months, our boats carried us more than five thousand miles. It would be conservative to estimate the combined river travel, then, to be far more than fifty thousand miles.

The work done on foot, requiring the services of many carriers, is indicated by certain examples. On the Tafelberg expedition of 1944, the direct line from the river camp to the farthest penetration of Tafelberg itself was about seventy-five miles. From the Kavanayen airstrip in the Gran Sabana to the summit camp on Chimantá-tepuí was nearly one hundred miles; we employed fifty-seven Indian carriers for this operation. At another time, from Kavanayen to Ilu-tepuí on the Venezuelan-British Guiana frontier and on to Kamarang on the Upper Mazaruni River of British Guiana was some one hundred and fifty miles. From the Cunucunuma River at the base of Cerro Duida to Cerro Marahuaca was approximately one hundred miles. The foot-miles covered have been enormous, certainly reaching into many thousands.

It must be remembered, in considering these distances between end-points, that they are not walked over only once but in relays many times by many people. Bear in mind that over all these miles of sea, of air, of river transportation, and by foot, tons of food supplies and equipment and collected specimens must be hauled. The problem of logistics

for this type of operation is complicated, arduous and costly in terms of money and human energy.

To extend this recitation of details, let me indicate something of costs. The tropical expeditions referred to above have cost some three-quarters of a million dollars. That rounded figure may be broken down into three parts: 1) salaries of principals which are paid by the parent institutions; 2) perquisites, services, and donations of equipment and supplies; subsistence and transportation on land and sea provided by resident oil and mining companies, transport companies, and by governments; and 3) cash outlay for the purchase of equipment, supplies, food, payroll, etc., etc., derived from foundations, industrial organizations, educational institutions, museums, and private individuals. Indeed, it was a private friend of The New York Botanical Garden, and my personal friend, H. R. Kunhardt, who made possible the initial exploration into the interior sandstone regions of the Guayana Highland by his contribution of some twenty-five thousand dollars, and by placing at the disposal of the expedition the tanker and on-the-spot facilities of the enormous Sinclair organization in Venezuela.

WHERE. Those who conduct successful explorations recognize that a rational and organized plan or program of operation must be established. Early, for us, such a rationale was established. Events which took place in the 1920's gave form and direction to the Garden's contemporary undertaking.

Demonstrated to have a most spectacular endemic flora by repeated excursions of British and German botanists, Mount Roraima, at the tricorners of British Guiana, Venezuela, and Brazil, was selected by the late G. H. H. Tate, Mammalogist at the American Museum of Natural History, as an area for the study of Guayana fauna. His expedition in 1925 obtained a poor sampling of animal forms, but ancillary botanical collection added considerably more records and novelties to the extraordinary flora of Roraima. The plants of this expedition came to The New York Botanical Garden and were studied by H. A. Gleason.

Two years later, Tate and Charles B. Hitchcock, geographer, and now Director of the American Geographical Society, effected the first ascent of the dramatic Cerro Duida on the upper Orinoco, another sandstone massif some four hundred miles to the west of Roraima. Here, too, the fauna proved scanty, but the flora even more spectacular in its wealth and great beauty of endemic genera and species of flowering plants. And again the plants came to The New York Botanical Garden and were studied by Gleason.

For a third time Tate organized an American Museum of Natural History expedition to still another great sandstone massif in the Gran Sabana of Venezuela. This had only shortly before come into prominence by the discovery and publicizing of the now widely known Angel Falls, which drop more than a half mile from the summit of Auyantepuí. And for the third time the story was repeated—a poor fauna and a great and spectacular flora, as shown by the published results of Gleason and Killip. William H. Phelps, a Caracas business man, and a competent ornithologist, financed this expedition at a cost of more than fifty thousand dollars. William H. Phelps, Jr., began his notable field career on this expedition.

It was only natural, then, that we at the Garden should seize upon the proved inducement of the sandstone regions of Guayana toward which to organize and develop a series of exploration in considerable depth and detail. In 1944, the first of these expeditions was made to the Kaieteur Escarpment in British Guiana, the eastern periphery of the sandstone highlands of Guayana, and to Tafelberg in central Suriname, an isolated sandstone mountain, some three hundred miles to the south and a bit east of the central mass

Open vegetation on the summit of Huachamacari. The heathlike ground plant is *Leitgebia guianensis* of the *Ochnaceae*, the broad-leaved shrub is *Stenopadus crassifolius*. Pitcher plants are in the background. Eugenio Rodrigues, competent trail man, carrying a basket of collected specimens, is examing an inflorescence of

Orectanthe sceptrum of the *Xyridaceae*. Close-up of the "Lost World" pitcher plant, *Heliamphora tatei*, which grows to a height of ten to twelve feet, is branched, and may bear several dozen "pitchers." (see front cover.)

Maquiritari Indian bearers are preparing to take cargoes down Huachamacari from our dismantled summit camp.

Right. On the approaches to Cerro de la Neblina at the Brazil-Venezuela frontier, our people cut and dug their way through a maze of connecting river channels. It required ten days to progress a dozen miles through this terrain.

of the sandstone shield. These expeditions were financed by Pierre Jay, then a member of the Board of Managers of The New York Botanical Garden, The Guggenheim Foundation, and the Davilla Mills Foundation.

The succeeding expedition, financed and encouraged by H. R. Kunhardt, Jr., led us to what we then considered to be the western periphery of the Guayana Highland, Cerro Sipapo, on the Alto Orinoco, deep in Venezuelan Guayana. Louis Politi and Bassett Maguire, Jr., were members of this expedition, and Bassett, Jr., and I conducted the following one to Cerro Marahuaca.

From these and the contemporaneous work of Mrs. William H. Phelps, Jr., on additional sandstone mountains, and of Richard E. Schultes who demonstrated the standstone area to be trans-Río Negro into Colombia, and the revisits of Steyermark to Duida and Roraima, and his initial exploration of Ptari-tepuí in the Gran Sabana, came striking proof that the periphery of Guayana was much greater than had been suspected, and that its flora was even more diversified and extensive than had previously been revealed.

This led to an enlargement of the scope of the program for the exploration of Guayana, to encompass the entirety of the Guayana Highland, that great region of sandstone exposure surmounting the crystalline Guayana shield of northeastern South America. There followed quickly and successively a series of expeditions into the numerous mountains of the "Lost World," all in large part supported by the National Science Foundation. Chiefly among those who have been associated with me in this phase of our work were Wurdack and Cowan (whose initial explorations were as graduate students) and Steyermark. In all, forty-two expeditions have been conducted by us and our associates to Guayana, the last major exploration being that of a second visit to Cerro de la Neblina in 1957, which we had "discovered" and named in 1953. The last joint expedition to Guayana was made by Steyermark, Celia Magurie, and myself to the headwaters of the Cuyuni River at the northern escarpment of the Gran Sabana only last year. At this writing, Steyermark, with the prominent Venezuelan explorer, Felix Cardona, is visiting Auyan-tepuí on the Gran Sabana on behalf of the National Herbarium of Venezuela and The New York Botanical Garden.

It soon became evident that although the floras of the mesa-summits of the Guayana Highland are effectively ecologically isolated from the adjacent lowland floras, striking floristic affinities and physiognomic similarities do exist between the summit floras and the low-altitude natural savannas. The intervening montane vegetation, as one would expect, exhibits often strong floristic relationships between the summit floras and those of the forest areas of the Orinoco and Rio Negro and Rio Branco Basins and the Atlantic drainages to the east. Further, it was demonstrated that the sandstone shield extends across the Rio Negro in Amazonian Colombia to the very foothills of the Andes itself, thus doubling the periphery of the sandstone area which we had undertaken to study. And since we were therefore by necessity concerned with the related extra-peripheral floras on the Atlantic side of Guayana, the Orinoco Basin to the north, that of the Rio Negro to the west and south, and the drainage of the south-flowing Rio Branco, the area of required competence expanded to the whole of the Atlantic drainage of northeastern South America, including the huge Amazon Basin and the eastern flanks of the Andes.

Thus, even while the program of exploration of the Guayana Highland was still under way, we organized and set into motion a seven-year program of exploration for the region of Guiana. Guiana we considered to be the Atlantic drainage region lying between the delta of the Orinoco on the north and west and the estuary of the Amazon at the great bulge of South America on the equator. Exclusive of the relatively small sandstone areas in British Guiana, the region was thus defined topographically and hydrographically, its native and mountain building rocks were crystalline, and its flora coherent. It embraced largely, then, the territory of Delta Amacuro in Venezuela, British Guiana, Dutch Guiana (Suriname), French Guiana, and Territorio Amapá, Brazil, lying north of the equator.

This program, financed initially by a grant of nearly one

hundred and fifty thousand dollars from the National Science Foundation and further supported by many industrial organizations and the governments involved, is still under way. Participating with me have been Howard S. Irwin, Julian A. Steyermark, João Murça Pires, and Walter A. Egler, who was tragically lost on the Rio Jarí expedition.

At this juncture, while repeated probes were being sent into the Guianas, to broaden instruction and understanding of correlation of floras, reconnaissance trips were designed for the entire length of the humid Andes in Colombia, Ecuador, Bolivia, and Peru. It was for this purpose that Godfrey Macdonald, Vice-President of Grace Line, sent us and our especially equipped "Jeep" station wagon through the Panama Canal to Buenaventura in Colombia. And it was at this time that the Colombian Government placed at our disposal for a week a two-motor Army Catalina which permitted us to fly over the sandstone area and to land from time to time in the upper river systems of the Rios Negro and Amazon, an area in eastern Colombia which, except for the important work of R.E. Schultes and Colombian colleagues, had been so largely botanically terra incognita.

Because in the study of the Guayana flora the lines of relationship and floristic affinities and possibly historic association had been, over and over again, directed towards the great Planalto of central Brazil, the "Jeep" reconnaissance was further extended to cross from Bolivia over the western Brazilian Mato Grosso and southern scrublands of São Paulo to Rio de Janeiro and thence north and westward onto the Planalto of Goias, past the new capital city of Brasília. It was on this occasion, after completing a twelve-thousand mile "Jeep" exploration, that we, our "Jeep," and collections were sent back to New York from Rio by the good office of Mr. and Mrs. Herman G. Place and by Albert J. Keenan, Vice-President of Moore-McCormack Lines.

This reconnaissance, further field work in Minas Gerais a year later, and another "Jeep" trip of more than seven thousand miles from Belém at the mouth of the Amazon to Brasília and westward across the Planalto of Mato Grosso and Rondonia to the foothills of the Andes of Bolivia, which was concluded last October with the collaboration of João Murça Pires, "Chefe" of Botany at the University of Brasília, made possible the arrangement with authorities at the University of Brasília for an extensive ten years of collaborative exploration and field study of the great Planalto of Brazil. In anticipation of this development, Irwin, who had himself previously conducted two extensive field excursions in the Planalto and who was interested in carrying on the work, was invited to the staff of The New York Botanical Garden in order that he might take the lead in the development and prosecution of this new program.

Beyond this there remains one additional region to conclude this mosaic of The New York Botanical Garden's investigation into the floras and vegetation of tropical South America east of the Andes. That remaining sector is the great Amazon Basin intervening between the Guayana Highland to the north and the Brazilian Highland to the south, of which the floras of Guiana, the Rio Negro, and the Rio Branco are, by extension, subprovincial parts. The next step logically will be the development of a fourth complementary program, that of the Amazon Basin, wherein resides the largest continuous tropical forest in the world. It would equally follow that this would be done in collaboration with the Universidade de Brasília and the Conselho Nacional de Pesquisas of Brazil and especially with local institutions.

This program of more than twenty years, in which some eighty expeditions have been carried out and from which nearly three hundred thousand specimens have been obtained, has been directed primarily towards the sandstone Guayana Highland, the "Lost World" of southern Venezuela, adjacent British Guiana, Brazil, and southeastern Colombia. Secondarily, it has led us to complementary explorations in the Orinoco and Rio Negro Basins, in the coastal Guianas, and the Amazon Basin. It has led to peripheral reconnaissance in the Andes itself and the Plantalto of Brazil.

We are now terminating this first phase of intensive exploration and are beginning the two others—a detailed and extensive program of exploration in collaboration with the

John J. Wurdack is doing triangulation, preparatory to mapping Cerro Neblina. The theodolite in use was provided by the American Optical Company.

This undescribed candelabriform genus of the *Theaceae*, the Tea Family, on the summit of Neblina is being admired by Dr. Wurdack.

Universidade de Brasília of the central plateau of central Brazil, itself conspicuously dominated by sandstones of probably comparable age to those of Guayana, and an intensive program which will concern itself with the flora of the Amazon Basin.

HOW. In the conduct of exploration, after objectives and financial considerations have been clarified and established, there are three principal areas in which smooth and effective operation must be achieved to obtain optimum results: 1) preparation at home; 2) logistical operations in the field; and 3) collecting procedures. I have alluded to matters of finance and a rationale for the choice of objectives. The three further considerations will be touched on briefly, since these topics are often the subject of discussion. My colleague, Dr. Irwin, will have something to say about it. I wrote a short piece on this topic in the November, 1957, issue of the Bulletin of the American Institute of Biological Sciences. Currently in the April number of *Natural History,* the organ of the American Museum of Natural History, there is an article, "Launching An Expedition," by Richard G. Van Gelder, Chairman of the Department of Mammalogy, in which he discusses the principle and the practice of exploration.

The most careful attention to detail must be given to the preliminary arrangements and organization of an expedition while it is still on home grounds. Meticulous care must assure that the expedition will have all essential items properly selected, properly divided, packed, numbered, and listed, so that the required item can be drawn from the numerous packing cases in the order and the amount needed. Forgotten or overlooked items remain lost to the expedition, and their loss or absence may be reflected in its ultimate productivity.

The phase of exploratory work often requiring the greatest skill and judgment, commodities which are usually acquired through experience, is that of logistical operation. It is exceedingly difficult to have precisely what one wants where he wants it at the time he wants it. Imagine an expedition operating from its staging base over hundreds of river miles and on foot over distances of twenty, fifty, and a hundred miles to elevations of four, five, six thousand feet under conditions of tropical montane forest and terrain, employing twenty, forty, sixty porters, and supplying as many as six or eight principals. Even with the most effective organization and supervision, advance parties sometimes get hungry and sometimes plant pressing and drying equipment may not arrive at the exact hour demanded. Terrain, weather, unpredictable aboriginals or natives, all have their place in and their contribution to the fortunes of the expedition. One must finally conclude that persistence and patience are just as important attributes of a leader of an expedition as are his organizational abilities.

Failures occur on all expeditions, each contributing to some smaller or greater deficiency. The deficiencies may add up to considerable quantity; but unless the expedition is a palpable failure, they remain obscured except to the consciousness of the operator himself. The chief consideration, however, is the overall accomplishment and that for most of us most of the time is gratifying.

Exploratory work does require physical exertion and does present some hazard. From snakes or wild animals there is relatively small danger, insects are often an annoyance. There are prophylactic precautions to be used against most of the feared diseases of the tropics. Specifics for common disorders such as dysentery are available. If properly and thoughtfully selected and prepared medicines and first-aid equipment are at hand and used, there is hardly more reason that one should get sick on a tropical expedition than at home.

The reason, if one excepts the pleasure of the thing, for exploration is to collect and observe plants. Obviously, the effectiveness with which this is done depends upon the personal acuity and training which one takes with him into the field. And the personal habits of neatness and precision with which the operator selects and cares for his materials and records his notes determine, to a very great extent, the character and quality of the expedition's returns.

WHY. There remains the last question and the most difficult to answer. Why is exploration carried on and what ultimately is to be achieved from it?

In simplest terms, the primary object of this intensive regional exploration has been to effect an inventory of the plant cover, principally of the vascular plants. For so vast an area, botanically so inadequately known, our work must be viewed as initial reconnaissance, that is, preliminary to a more detailed study which must be made in time to come.

Problems confronting the botanist in the American Tropics are in many ways more complicated than those of a botanist working in temperate areas. Lack of means of transport and the combination of natural factors, such as ruggedness of terrain, intensity of rainfall, lack of indigenous food sources, and the very richness of the flora itself, all combine to make tropical field operation slow and laborious. Results, however, are inversely rewarding.

We have attempted to approach this job of exploration in a systematic way, but actually we have set foot on a relatively small percentage of the areas visited. To cover these areas adequately and to collect from them sufficiently to enable us to understand the floras and vegetation as well as we do that of the United States, will take many more people a considerably longer time at a considerably greater cost than we and all our contemporary colleagues have been able so far to effect.

The great richness of the floras and their diversity throughout the entire range compound the problem of effective coverage. No one knows how large the flora of the Neotropics really is. For that matter, I have been unable to find a figure indicating the size of the flora of the United States. If we were to compare the density of the specific population of plants in the northeastern States, for instance, with that of Guayana, there would seem to be eight to ten times a greater specific population ratio in Guayana.

It has been estimated that the flora of tropical South America may equal one hundred thousand species. Many competent botanists feel, as I do, that the number actually exceeds this large figure. As I have indicated above, it will take several generations of competent, systematic botanical study and hard, intensive field work to develop a satisfactory, meaningful inventory of the American Tropics.

Collateral or subordinate to inventory are many areas and disciplines which inventory serves. It supports the systematic work of taxonomy. It provides or locates source material

for cytological, morphological, and physiological studies. It should support the work of the ecologist, the geographer, and the geologist. It provides a basis upon which to effect disciplined land-management and land-administration for efficient, conservative exploitation of these most important natural resources. It provides information upon which to base essential programs for the conservation of natural areas.

Our own contemporary contribution to the inventory of tropical American plants has been the collection of more than a quarter of a million specimens. All these have added to our knowledge of geography and composition of floras and vegetation. Perhaps two thousand new species of vascular plants will have been added to the world's roster, and probably more than fifty, possibly a hundred new genera. The reports of these findings are being brought together in *The Memoirs of The New York Botanical Garden* under the title of "The Botany of the Guayana Highland." This series, now approaching its sixth part, is approximately half completed. A less formal series of papers will report findings of the Guiana program. It is to be expected that the work in the Brazilian Highland and Amazon Basin will bring forth comparable series of publications.

But perhaps the most important contributions of our exploratory work will have been made by supplying elements of detail for the preparation of future monographs and floras, for factual systematic floristic phytogeography, and for the development of information leading to an understanding and interpretation of the origin and dispersal of the floras of the Neotropics as they here occur and as they relate to the floras of the rest of the world.

We have reached a twenty-year breathing point. Part of our continuing program is achieved, part is in its initial stage, and part is in its developmental stage. The background work goes on progressively and without interruption.

In the succeeding piece, 129 expeditions or field excursions conducted by The New York Botanical Garden in its behalf, or from which it has been the principal recipient of collected plants, from 1946 to the present are listed. More than half have to do with exploration in the American Tropics, and the above account is concerned with most of them.

It is well nigh impossible to make full or appropriate acknowledgment to the many persons who have given interested help and encouragement to the Garden's tropical program. Numerous foundations, government agencies, industrial organizations, and business firms have provided money, equipment, services, supplies, and perquisites. I wish to acknowldge the contributions of all. Without their support, which in aggregate has equaled a half million dollars, this long and enrichening program could not have been accomplished. If the list is extended, the contributors are many. Chief among our benefactors have been:

PRIVATE CONTRIBUTORS. H. R. Kunhardt, Jr., William H. Phelps, William H. Phelps, Jr., Pierre Jay, and Mrs. Silas H. Witherbee.

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Bassett Maguire and his wife, Celia, at one of the finest vantage points in South America—Kaieteur Falls.

INDUSTRIAL ORGANIZATIONS AND BUSINESS FIRMS. Alcoa Steamship Company, Inc.; American Optical Company; Astoria Importing and Manufacturing Company, Inc.; Bethlehem Steel Company, Inc.; Booth American Shipping Corporation; Demerara Bauxite Company (Aluminum Company of Canada) Ltd., Eli Lilly & Company; F. W. Woolworth Company; Grace Line Inc.; Gulf Oil Corporation; Industria e Comercio de Mineirios S. A. (ICOMI); Johnson Motors; Mene Grande Oil Company; Moore-McCormack Lines, Inc.; National Bulk Carriers, Inc.; Orinoco Mining Company; Parke, Davis & Company; Sears, Roebuck & Company; Sinclair Oil Corporation; Suriname Bauxite Company (Aluminum Company of America); The Texas Company; Union Carbide Corporation (African Manganese Company); U. S. Steel Corporation; Varig Airlines; Venezuelan Navigation Company; and Warner-Lambert Research Institute.

Inevitably there come to mind individuals who are especially remembered because of their services, sympathetic interest, and participation. Among them are: Tobias Lasser of the Instituto Botanico, Caracas; William H. Phelps, Kathleen D. Phelps, and William H. Phelps, Jr., of the Colección Phelps, Caracas; Francis Thomas of the Orinoco Mining Company; William C. White and Frank Bell of the Alcoa Steamship Company; Robert D. Butler of ICOMI; Godfrey Macdonald of Grace Line; Guido Pabst of Varig; H. R. Kunhardt, E. L. Steiniger, Julia Baumann, Adolph Michelson, and L. J. Maurovich of Sinclair Oil Corporation; Hoyt Sherman and Bernard Ibbetson of Mene Grande Oil Company; and Bob Shaylor, Byron Reihart, and William Northrup of the New Tribes Mission in Venezuela.

BOTANICAL EXPLORATION CONDUCTED BY THE NEW YORK BOTANICAL GARDEN

1946 - 1964

By BASSETT MAGUIRE

In 1946, Dr. Gleason[1] compiled a list of botanical expeditions and field trips conducted by or in behalf of The New York Botanical Garden, from the date of its foundation to and including 1946. He recorded 248 separate expeditions, reporting participants, year, and place of exploration.

The following is a sequel to that report. Expeditions and field excursions mounted by the Garden, made in its behalf or from which the Garden was the chief beneficiary (plant-wise), are listed from 1946 to the present date, in the number of 129.

1947

Kathleen D. Phelps and Charles B. Hitchcock; Cerro Yaví, Amazonas, Venezuela; conducted by William H. Phelps, Jr.; March 1-3.

1948

Bassett Maguire, H. R. Kunhardt, Louis Politi; Estados Anzoategui and Monagas, Venezuela; October 21-November 4.

Bassett Maguire, Louis Politi, and Bassett Maguire, Jr.; Cerro Sipapo (Paráque), Territorio Amazonas, Venezuela; November 15, 1948-March 15, 1949.

Kathleen D. Phelps and Charles B. Hitchcock; Uaipán-tepui, Gran Sabana, Estado Bolívar, Venezuela, conducted by William H. Phelps, Jr.; January 15-February 15.

1949

Bassett Maguire; Belém, Pará, Brazil.

Kathleen D. Phelps and Charles B. Hitchcock; Cerro Parú, Territorio Amazonas, Venezuela; conducted by William H. Phelps, Jr.; February.

Bassett Maguire and Bassett Maguire, Jr.; Cerro Duida, Cerro Marahuaca, Territorio Amazonas, Venezuela; April 18-May 21.

1950

Bassett Maguire; Río Atabapo, Territorio Amazonas, Venezuela; October 17-26.

Bassett Maguire, Richard S. Cowan, and John J. Wurdack; Cerros Duida and Huachamacari, Territorio Amazonas, Venezuela; November 1-December 31.

1951

Bassett Maguire, Richard S. Cowan, and John J. Wurdack; Cerros Yapacana and Moriche, Territorio Amazonas, Venezuela; January 1-22.

Richard S. Cowan and John J. Wurdack; Cerro Parú, Territorio Amazonas, Venezuela; January 31-February 21.

Bassett Maguire, Kathleen D. Phelps, Charles B. Hitchcock, and Gerald Budowski; Cerro Guanay, Territorio Amazonas, Venezuela, conducted by William H. Phelps, Jr.; January 23-February 5.

Bassett Maguire, Kathleen D. Phelps, Charles B. Hitchcock, and Gerald Budowski; Cerro Camani, Territorio Amazonas, Venezuela; conducted by William H. Phelps, Jr.; February 12-17.

Bassett Maguire; Puerto Ayacucho, Territorio Amazonas, Venezuela; March 4.

Richard S. Cowan and John J. Wurdack; Santa Barbara, junction of Ríos Orinoco and Ventuari, Territorio Amazonas, Venezuela; February 21-23.

Bassett Maguire; Eagle Mountain and Mt. Ebini, Potaro River, British Guiana; October 12-18.

Bassett Maguire and F. D. Fanshawe; Imbaimadai, Membaru-Kurupung, Kamarang, British Guiana; October 12-18.

Bassett Maguire; Cerro Bolívar, Estado Bolívar, Venezuela; December 1-December 2.

Bassett Maguire; Río Paragua, Cerro Guaiquinima, Estado Bolívar, Venezuela; December 7, 1951-January 19, 1952.

1952

Bassett Maguire; Kavanayén, Ilu-tepuí, Gran Sabana, Estado Bolívar, Venezuela; February 3-April 4.

Bassett Maguire, John J. Wurdack, Celia K. Maguire, and Edward McGuire; Kavanayén, Ptari-tepuí, Gran Sabana, Estado Bolívar, Venezuela; The New York Botanical Garden in collaboration with the American Museum of Natural History; December 11-23.

1953

John J. Wurdack; Chimantá-tepuí, Gran Sabana, Estado Bolívar, Venezuela; January 1-February 14.

John J. Wurdack; Cerro Bolívar, Estado Bolívar, Venezuela; February 24-March 2.

Bassett Maguire and Celia K. Maguire; Cerro Yutaje, Territorio Amazonas, Venezuela; January 28-March 10.

Bassett Maguire, John J. Wurdack, and Celia K. Maguire; Alto Río Orinoco, Ríos Casiquiare, Negro and Guainía, Territorio Amazonas, Venezuela; March 15-April 24.

Arthur Cronquist; Oregon; April 1-August 15.

Bassett Maguire and John J. Wurdack; Cerro Bolívar and El Pao, Estado Bolívar, Venezuela; April 30-May 2.

John J. Wurdack and George S. Bunting; Cerro Bolívar, Estado Bolívar, Venezuela; October 18-27.

Bassett Maguire, John J. Wurdack, U. S. Air Force Attache personnel, William H. Phelps, Jr., Frederick W. Wright, Jr., James H. Kempton, and others; seven-hour flight of reconnaissance, Ciudad Bolívar, Cerro de la Neblina and return; October 31.

Bassett Maguire, John J. Wurdack, and George S. Bunting; Ríos Orinoco, Atabápo, Casiquiare, Guainia, Pacimoni and Yatúa, and Cerro Neblina, Territorio Amazonas, Venezuela; November 7, 1953-February 18, 1954.

1954

Bassett Maguire, Arthur H. Holmgren, Doris Holmgren, and Celia K.

1 Gleason, H. A. Botanical Exploration from The New York Botanical Garden 1897-1946, Journ. N. Y. Bot. Gard. **47**: sect. 2, 23-27. 1946.

Maguire; intermountain United States—Utah, Idaho, Oregon, Washington, Nevada, and Arizona: June-July.

John J. Wurdack and Nicholas Guppy; Hato la Vergareña, Estado Bolívar, Venezuela; October 9-25.

Bassett Maguire, Richard S. Cowan, and Celia K. Maguire; Cayenne, French Guiana; October 26-27.

Bassett Maguire and Richard S. Cowan; Serra do Navío, Rio Amaparí, Amapá, Brazil; November 1-26.

Bassett Maguire and Celia K. Maguire; Serras Tepequem and do Sol (Uei-tepuí), Territorio Rio Branco, Brazil; November 19, 1954-January 7, 1955.

Richard S. Cowan; Oiapoque, Amapá, Brazil; Cayenne, Montagne de Kaw and St. Laurent, French Guiana; November 26-December 20.

Richard S. Cowan and J. C. Lindeman; Moengo, Nassau Gebergte, Suriname; December 26, 1954-January 10, 1955.

1955

Julian A. Steyermark and John J. Wurdack, The New York Botanical Garden in collaboration with The Chicago Natural History Museum; Chimantá-tepuí, Gran Sabana, Estado Bolívar, Venezuela; January 8-March 16.

Richard S. Cowan; MacKenzie, British Guiana; January 17-18.

Bassett Maguire, Richard S. Cowan, and Jonah Boyan; Mathews Ridge, Northwest District, British Guiana; January 22-February 17.

Bassett Maguire, W. M. C. Bagshaw, and Celia K. Maguire; Mt. Ayanganna, Kaieteur Plateau, British Guiana; February 1-15.

Bassett Maguire and Celia K. Maguire; Moengo, Nassau Gebergte, Suriname; February 28-March 20.

John J. Wurdack; Delta Amacuro, Hato la Vergarena, Estado Bolívar, Venezuela; March 27-April 24.

Arthur Cronquist; Oregon and Montana; April 15-August 31.

David D. Keck; California, investigation contributory to a California Flora; summer, 1955.

Bassett Maguire and Celia K. Maguire; Delta Amacuro-Cerro Imataca, Hato la Vergarena, Estado Bolívar, Venezuela; September 4-25.

Bassett Maguire, John J. Wurdack, and J. V. Monachino; Delta Region, Estado Monagas, Venezuela; September 18-October 3.

John J. Wurdack and J. V. Monachino; Cerro Imataca, Estado Bolívar, Venezuela; November 5-26.

John J. Wurdack and J. V. Monachino; Middle Orinoco, Estados Bolívar and Apure, between Río Pargueni and Cerro Baraguan; December 3, 1955-January 29, 1956.

1956

Bassett Maguire and William B. St. John; Honduras; January 29-February 12.

Bassett Maguire and Celia K. Maguire; study of Guayana materials in the major herbaria of Europe; May 18-October 25.

David D. Keck; California, investigation contributory to a California Flora; summer, 1956.

John J. Wurdack, J. M. Pires, and George Black; Serra Cachimbo, Pará, Brazil; The New York Botanical Garden in collaboration with The Instituto Agronomico do Norte; December.

1957

David D. Keck; California, investigation contributory to a California Flora; summer, 1957.

Bassett Maguire, John J. Wurdack, Celia K. Maguire, and William M. Keith, Jr.; Alto Río Orinoco, Río Atabapo, Río Guainía, Río Casiquiare, and Río Pacimoni, Territorio Amazonas, Venezuela; September 11-October 15.

Bassett Maguire, John J. Wurdack, and Celia K. Maguire; Río Pacimoni-Yatua, Cerro de la Neblina, and Alto Río Orinoco, Territorio Amazonas, Venezuela; October 16, 1957-January 18, 1958.

1958

Bassett Maguire, John J. Wurdack, William H. Phelps, Jr., and Charles D. Reynolds of the Orinoco Mining Company, E. A. Bauman of the Creole Petroleum Corporation, Major Werner Preusker of the Inter-American Geodetic Survey, U. S. Air Force Attache personnel, and others, concluding air reconnaissance of Cerro de la Nellina; March.

Clark T. Rogerson; Adirondacks, New York; June 16-20.

Clark T. Rogerson; Adirondacks, New York; June 21-30.

Clark T. Rogerson; central Indiana, near Bloomington; August 20-24.

Clark T. Rogerson; southern Ontario, near Chaffey Locks, and in the Adirondacks, New York; September 24-28.

Clark T. Rogerson; Long Island, New York; October 20-25.

1959

Arthur Cronquist and A. H. Holmgren; mainly Oregon and Nevada, some California, Idaho, Wyoming, and Utah; April 15-August 25.

Clark T. Rogerson; northern Catskills, New York; May 6-10.

John J. Wurdack and Lincoln Adderley; middle and upper Río Orinoco, Río Atabapo, Río Casiquiare, Río Guainia, Río Pacimoni and Río Siapa, Territorio Amazonas, Venezuela; May 15-August 8.

Herman F. Becker and Paul Roper of the University of Michigan; Ruby Basin, southwest Montana; June-August.

Bassett Maguire and Celia K. Maguire; "Jeep" trip through the Andes of Colombia, Ecuador, Peru, and Bolivia; July 31-November 13.

Clark T. Rogerson; Long Island, New York; August 2-9.

Bassett Maguire, Celia K. Maguire, Alvaro Fernandez-Perez, and personnel Colombian Air Force; Catalina reconnaissance Guayana sandstone areas of Amazonian Colombia; September 1-6.

Clark T. Rogerson; in Quebec, near Duchesnay, in Laurentide Park, north and south shores of St. Lawrence River; September 1-7.

Clark T. Rogerson; Adirondacks, New York; October 1-8.

Bassett Maguire, and Celia Maguire; "Jeep" trip to Mato Grosso and São Paulo, Brazil; November 22-December 10.

Bassett Maguire, J. M. Pires, and Celia K. Maguire; Estados Guanabara, Minas Gerais and Goias, Brazil; The New York Botanical Garden in collaboration with the Instituto Agronomico do Norte, Belém; December 11-25.

1960

David J. Rogers; Jamaica and Belém, Pará, Brazil; collection of cultivars of *Manihot* for amino-acid analysis; June-July.

William C. Steere; Brooks Range of Arctic Alaska, based at the Arctic Research Laboratory, Point Barrow; June-August.

Bassett Maguire, Stephen S. Tillett, Celia K. Maguire, Carolyn L. Tillett, and Rufus Boyan; Merumé Mountains (Partang River), Mt. Ayanganna, and the Kukui, Kako, Kamarang Rivers, all affluents of the upper Mazaruni River, Pakaraima Mountains, British Guiana; June 8-November 2.

Bassett Maguire, Walter Egler, João Murça Pires, Howard S. Irwin, Celia K. Maguire, and Lubbert Westra; Survey of the Rio Oiapoque, Amapá (French Guiana border), Brazil; The New York Botanical Garden in collaboration with the Instituto Agronomico do Norte and the Museu Goeldi; July 8-November 6.

Bassett Maguire, Celia K. Maguire, and Geraldo Mendes Magalhaes; sandstone Planalto of Minas Gerais, Brazil; The New York Botanical Garden in collaboration with the Instituto Agronomico of Belo Horizonte; August 4-28.

Clark T. Rogerson; Louisiana; August 22-26.

Arthur Cronquist; Costa Rica and Honduras; October 1-31.

Clark T. Rogerson; Adirondacks, New York; October 3-10.

Clark T. Rogerson; Blue Ridge Mountains, North Carolina, South Carolina, and Georgia; October 14-24.

William C. Steere; Chaco region of Argentina, after the meeting of the Sociedad Argentina de Botánica at Tucumán; November-December.

1961

David J. Rogers; Brazil, from São Paulo north to Belém; *Manihot* studies, wild and cultivated material; January-March.

Pierre Dansereau, G. T. S. Baylis, Alan Mark, Peter Wardle, et al.; New Zealand; April-June.

Arthur Cronquist and Noel Holmgren; Utah and Nevada; April 15-July 20.

Herman F. Becker and Chester A. Arnold of the University of Michigan; North Dakota, Idaho, Oregon, Utah, and Colorado; May-June.

Herman F. Becker and Peter Roff of Hunter College; Ruby Basin, Grant-Horse-Prairie Basin, Montana; June-August.

William C. Steere; Brooks Range of Arctic Alaska, based at the Arctic Research Laboratory, Point Barrow; June-August.

Clark T. Rogerson; southern New York, Allegany State Park; June 8-12.

Clark T. Rogerson; Blue Ridge Mountains, North Carolina, South Carolina, and Georgia, and in the Great Smoky Mountain National Park, North Carolina and Tennessee; July 20-August 24.

Pierre Dansereau, Hans Hürlimann, Michel Corbasson, and Jean-Noël Maclet; New Caledonia, Tahiti; July.

Howard S. Irwin and Walter Egler; Rio Jarí, Territorio Amapá, Brazil; The New York Botanical Garden in collaboration with Museu Goeldi, Instituto Agronomico do Norte, and the Conselho Nacional de Pesquisas; July 14-October 2.

João Murça Pires, William Rodrigues, and Gary Irvine; Río Araguari, Territorio Amapá, Brazil; The New York Botanical Garden in collaboration with Museu Goeldi, Instituto Agronomico do Norte, and the Conselho Nacional de Pesquisas; July 26-October 10.

Pierre Dansereau, Pacific Science Congress Excursion; Hawaii; August.

Bassett Maguire, Celia K. Maguire, and G. Wilson-Browne, S. J.; Drainages of the Ireng and Kopinang (Potaro River affluent) Rivers, southern Pakaraima Mountains, British Guiana; August 21-September 25.

William C. Steere; Oahu, Hawaii, in connection with the Tenth Pacific Science Congress in Honolulu; September.

1962

David J. Rogers, Bolivia, Peru, Brazil, and Venezuela; *Manihot* studies, wild and cultivated material; January-February.

Pierre Dansereau, J. H. Davis, Carl Monk, F. C. Craighead, and P. B. Tomlinson; Florida; January.

Pierre Dansereau, Roy Woodbury, Gustavo Candelas, José F. Maldonado, Eric Matthews, Bob Benn, Tom Hicks, and H. Heatwole; Puerto Rico; February and December.

Pierre Dansereau, Warren Grabau, Clair A. Brown, and R. Vanhoorne; Mississippi, Louisiana; April.

Pierre Dansereau and Paul Martin, International Palynology Conference Excursion; Mexico; April.

Pierre Dansereau, J. Mosimann, J. Koob, A. Watts, P. Martin, et al.; Arizona; April.

Caroline K. Allen; Venezuela, Suriname, Brazil; University of Los Andes, Merida Jardin Botánico, Caracas, Venezuela; field investigations of tropical American *Lauraceae*; May 20-September 4.

Herman F. Becker and Charles Miller of the University of Michigan; Ruby Basin and Grant-Horse Prairie Basin, southwest Montana; June-September.

Pierre Dansereau and G. Laverdiére; Gaspé; June-July.

Bassett Maguire; Trinidad; June 30-July 7.

João Murça Pires and Paulo B. Cavalcante; Coastal Amapá, Brazil; The New York Botanical Garden in collaboration with Museu Goeldi, Instituto Agronomico do Norte, and the Conselho Nacional de Pesquisas; July 7-August 29.

Bassett Maguire and Celia K. Maguire; reconnaissance of northeast coastal region of Brazil, from the State of Guanabara to Pará; July 8-August 4.

Clark T. Rogerson; northern Michigan at the Biological Station of the University of Michigan; July 20-August 5.

Pierre Dansereau, W. W. G. Moir, Frits Went, W. S. Stewart, Otto Degener, and C. Lamoureux; Hawaii; August.

Pierre Dansereau, G. L. Stebbins, and Mr. Schofield; western United States and Canada; August.

Bassett Maguire, Julian A. Steyermark, and Celia K. Maguire; sandstone escarpment and northern slopes, Upper Río Cuyuni, Estado Bolivar, Venezuela; The New York Botanical Garden in collaboration with the Instituto Botánico, Caracas, Venezuela; August 13-September 15.

Clark T. Rogerson; Oregon, near Corvallis; August 22-26.

Clark T. Rogerson; Ontario, north of Toronto; September 6-12.

Arthur Cronquist and Rogers McVaugh; Mexico; September 20-November 20.

Pierre Dansereau and Hyrum Johnson, Association of American Geographers field trip; New York area; October-November.

Bassett Maguire; Port Antonio, Jamaica; December 16-23.

1963

Pierre Dansereau, Roy Woodbury, Peter Buell, and Bob Benn; Puerto Rico; February-March.

Bassett Maguire; Paramaribo, Suriname; preliminaries for Wilhelmina Expedition, Brasília in Distrito Federal, Brazil; organizational visit for collaborative program between the Universidade de Brasília and The New York Botanical Garden; April 3-13.

William C. Steere; Japan, in connection with a panel meeting of the United States-Japan Cooperative Science Program; May.

William C. Steere; western Greenland; centered mainly at the University of Copenhagen's Arctic Laboratory at Godhavn and at Narssaq; May.

Arthur Cronquist; Nevada; May 6-22.

Pierre Dansereau, J. W. Marr, A. S. Watt, and P. Wardle; Colorado; June.

Bassett Maguire, Howard S. Irwin, J. P. Schulz, Ghillean Prance, Thomas R. Soderstrom, Noel Holmgren, Celia K. Maguire, and Gerold Wessels-Boer; exploration of the Wilhelmina Mountains, with assistance of the Departments of the Military, Forestry, Lands and Mines, Suriname; June 26-October 8.

Pierre Dansereau, A. Maldonado, Hyrum Johnson, and E. Fulling; New York area; July-October.

Clark T. Rogerson; Uintah Mountains, Utah, headwaters of Provo River; July 19-25.

Bassett Maguire, João Murça Pires, Celia K. Maguire, and Nilo T. Silva; reconnaissance along Belém-Brasília-Acre (Brazil) Highways; The New York Botanical Garden in collaboration with the Universidade de Brasília; July 26-October 20.

Pierre Dansereau, Daniel Waltz, Hyrum Johnson, J. M. Deschenes, and Frére Rolland-Germain; Gaspé; August-September.

Clark T. Rogerson; western Massachusetts; August 23-26.

Clark T. Rogerson; north side of Catskills, near Oneonta, New York; September 18-23.

Bassett Maguire; Barro Colorado, Panama Canal Zone; November 4-9.

1964

Pierre Dansereau and Hyrum Johnson; Gaspé; February.

HERBARIUM SPECIMENS AND EXPLORATION IN GUIANA

By Howard Irwin

Dr. Irwin is Associate Curator of The New York Botanical Garden.

From its very inception The New York Botanical Garden has been deeply involved in the annual mounting of botanical expeditions to the American humid tropics. Beginning with H. H. Rusby's trips to Peru and Dr. and Mrs. Britton's excursions to the West Indies, the list of participants has increased to over one hundred persons. With so many people, it is not surprising that over the years there developed numerous modifications and innovations in methods of carrying out the principal work of these expeditions —the collection and preparation of botanical specimens.

In this article I shall make some general remarks on herbarium specimens, especially about the special conditions imposed on us during the course of preparation of specimens in Guiana. Then I shall outline the type of procedure followed and the various problems encountered in our recent expeditions to that area.

Above. Frederick, the cook, is busy preparing dinner.

Left. Frederick, the cook, cleans up after dinner is over.

As the horizons of plant taxonomy expand, from the use of the biochemical composition of plants as a new taxonomic tool to the analysis of taxonomic thinking in connection with computer application, the question is occasionally put, "What about dried herbarium specimens? Are they still important?" Such questions indicate imbalance of emphasis in our university botany departments. The accelerating growth of molecular biology is not opposed or even resented; it is regarded not as a "fad," but rather as a welcome expansion of the biological spectrum. What is of concern to the taxonomist is that, in considerable degree, this is being accomplished with "classical taxonomy" in the role of whipping boy. To this extent the spectrum is not broadening but merely shifting. Taxonomists have been remiss in presenting their case, not only to the public but to their peer scientists in related disciplines. Regarding the immediate subject, the most pressing need in the Neotropics is the formulation of an inventory of the biota. Stated simply, it is a quest for basic knowledge, an attempt to put order into seeming chaos. In the words of Linnaeus, "If you know not the names, there is lost also the knowledge of things."

Thus the answer to the questions is a "yes" sounded in *forté,* for the primary classification of Angiosperms is still very largely based on herbarium material. Despite the antiquity of the underlying premise and methodology, and the relative simplicity of preparation, the herbarium specimen differs from the living plant—in the taxonomist's view—in just two respects: reduction of a plant or plant-part from a three dimensional object to a two dimensional one; reduction of water content. The first consideration is a matter of space economy; the second, of preservation. Properly mounted, housed, and cared for, herbarium specimens will last indefinitely.

Essential to promoting the highest utility of herbarium specimens is the exercise of good collecting technique. Much has been written on this subject, the fundamental consideration being, in light of today's heightening costs, that a specimen worth the time spent in collecting, noting, drying, shipping, mounting, and filing is certainly worth time spent in careful selection and preparation. Progress in this area has been made in recent years, but it is still lamentably true that a great proportion of the specimens in the world's herbaria are poorly documented scraps which, because of their tendency to confuse or misdirect the taxonomist, often have negative value. Today curators tend to cast a flinty eye on poorly prepared accessions, and are not above discarding material which would prove useless.

In perusing a recently published botany textbook, I was amused to read under the head "pressing and drying" that one would secure superior specimens by changing the drying papers in the press every twelve hours. This advice refers to the still much-followed practice of alternating plant specimens and blotting papers in a press, and the periodic substitution of dry blotters, the wet ones then being laid out in the sun or before a fire. I smiled at the recollection of my own experience with this procedure when I first began collecting in British Guiana, at my impatience with the time required for so many of the thick-leaved or fleshy-stemmed specimens to dry (sometimes more than two weeks), at my disappointment with the often blackened, moldy, disarticulated product. In this, as in most aspects of field work, the climate, resources, nature of specimens, and time available have caused us to make compromises on the one hand, to devise special measures on the other. I shall describe these in more detail in later paragraphs.

What about the Guiana forest? What are the special conditions it imposes on us? What procedures do we follow to make the best use of our means?

In today's ecological lexicon, it is called rain forest, the first syllable of the term having particular significance. Vegetation in lowland tropics is primarly controlled by the amount and temporal distribution of rainfall. Rain forest

Jan Elburg, forester, and Nunes, foreman of field men, in camp in the Wilhelmina Mountains, Suriname, 1963.

results from a high rainfall, often over one hundred inches a year, sometimes more than two hundred. In temperate North America such high annual precipitation is approached only on the windward slopes of the Olympic Mountains in Washington. In Guiana these eight or more annual feet of water fall in torrential showers, often of brief duration, and seldom in prolonged drizzles. Humidity on the forest floor is high, rarely far below the saturation point; the temperature is nearly constant, in the lowlands somewhere between 75° and 80° F; and beneath the dense, nearly continuous canopy of green fifty to one hundred feet above, the light is dim.

Tropical rain forest is commonly called "jungle," an application I have never liked. It calls up mental pictures of trees seething with snakes, panthers crouched in the brush, centipedes crawling into the boots of pith-helmeted, machete-swinging explorers, hacking their way through the green hell. There is hardly any place, outside the fanciful minds of screen writers and third-rate novelists, which combines all these conditions. Thick tangles of vegetation do spring up as second growth after rain forest has been cleared. Almost throughout the forested tropics people engage in a slash-and-burn type of agriculture. Trees are felled, allowed to dry, burned, and then crops are planted among the charred logs. The soil soon deteriorates and harvests rapidly diminish. The clearing is abandoned and a new one cut. The abandoned plot soon falls heir to a homogeneous thicket of vines, shrubs, and weedy trees, few of them, incidentally, of species present in the original forest. Small mammals, especially rodents, thrive; they in turn attract snakes. Myriads of insects—mites, flies, and mosquitoes as well as ticks—move in. This is about as close to green hell as one can get.

True rain forest, untouched, hardly trodden by man, is a very different sort of place. Tall, slender trees predominate. Beneath them the forest floor is carpeted with the richly variegated browns of many different kinds of fallen leaves, sometimes brightly sprinkled with blue or red or yellow flowers which have fallen from above. The leafy carpeting is thin, easily scuffed away to reveal the white or brown sand or red lateritic clay—soil types characteristic of these regions. There is no thick accumulation of leafmold, no rich blanket of humus. Decay proceeds too fast to permit much organic accumulation in the soil.

Because of the dim light, there is surprisingly little vegetation on the forest floor. Tree seedlings, most with no chance of survival, are scattered here and there as are shade-tolerant ferns, dwarf palms, and large-leaved aroids. Basically, the forest floor is open, with vistas of two hundred feet or more framed by the clean, slender trunks. The cliché "cathedral-like" is often applied to rain forest as seen from beneath. It is an inevitable comparison: the damp coolness, subdued light, utter stillness, the massive grandeur of forest giants, often supported by giant buttresses, the curiously undulating pattern of lianas contrasted against the smooth gray boles or looping down from the overhead canopy. Awe and wonder come easily, even exultation, and sometimes, for a man alone, fear. Lest I carry this to excess, I should recall the words of P. W. Richards: "Tropical vegetation has a fatal tendency to produce rhetorical exuberance in those who attempt to describe it."

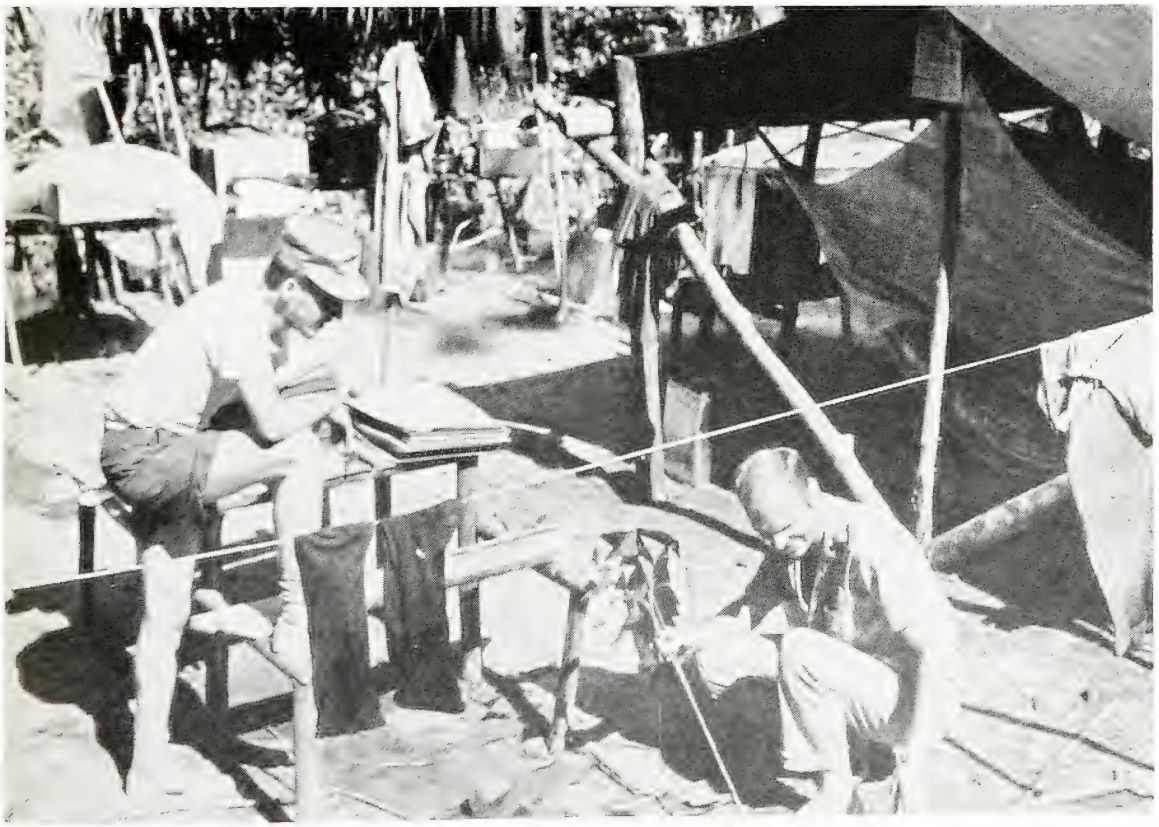
There are really only two practical means of travel in rain forest areas—by canoe and on foot. Naturally for greater distances the former is preferable; and with one end cut off and a flat transom substituted, the traditional dugout accepts the outboard motor and becomes the motor vehicle of the forest-bordered water highway. In mountainous areas, where the rivers have their sources, the only way to travel is by foot—and at times it is difficult. Not only must a trail be blazed, but food, camping gear, supplies, collecting equipment—everything must be brought in. This requires the

services of strong men, men accustomed by long experience and conditioning to bear loads of fifty pounds or more for several hours over rugged terrain. Generally Indians fill this need, although in Suriname the Djukas, descendants of freed slaves who have since led a more or less tribal existence, serve admirably.

Much planning goes into an expedition long before it leaves New York. In our Guiana work it has proved most helpful to have resident liaison persons in commercial centers in the area to help with food purchases, fuel and canoe procurement, local transportation, the field labor force and so on. Their suggestions and information on travel routes, weather data, and special precautions contribute much toward making the best use of the time and money available. Often, as in our recent Suriname trip, we have had the assistance of the military and various government departments whose personnel have had "bush" experience. Their participation follows early conferences with governmental officials, some of whom are eager for their people to participate in such an undertaking, and our desire to get the best, most competent assistance available. In short, anything which will lighten the load, save time, and reduce expenses—without compromising the effectiveness of the operation—is eagerly sought. This continues even as the field phase begins, for it is then that the local game situation, current rainfall pattern, location of Indian trails, and local hazards are checked.

The most expensive and most trying aspect of an expedition is transportation, especially local transportation. The transport problem, either going or returning, can be divided into three phases: (1) New York to the most convenient commercial center in the host country; (2) from that center to the most accessible staging area; (3) from the staging area to the area of intensive collecting activity. In the first phase, we have been fortunate, indeed, to have had the cooperation of the Alcoa Steamship Company, which has helped enormously in keeping our long-distance freight costs to a minimum. A wide variety of materials is sent: cooking gear, tarpaulins, outboard motors, presses, newspaper (one thousand to fifteen hundred pounds for each expedition), and medical supplies. Personnel may fly to the host country after the arrival of the equipment and supplies. Upon their arrival the second phase begins, the movement of expedition gear to an interior area, usually by chartered aircraft. Careful planning is required, for this can become a most expensive operation if not closely controlled. The third phase is part of the expedition itself, for here we move by dugout and make camps along the river. During stopover periods collecting is done, mainly in areas directly accessible from the river highway. Soon a point is reached beyond which water transport must be superseded by overland travel, this being determined by the limit of navigation—rapids and waterfalls or excessive debris, such as fallen trees, in the water, seldom by the small size of the stream—or by the nearest approach which can be achieved by water. At this point a camp is constructed, one which in effect becomes a way station, a place where two modes of transport are joined. Since one mode is much more efficient, there must be a magazine or store for the temporary storage of goods, incoming or outgoing, which await trans-shipment.

In most expeditions there is a geographical target, a region of particular interest for which the entire expedition may be named. The movement of equipment and supplies to the target area is commonly slow, requiring the construction of several camps. It is in this phase that collecting begins intensively. While the bearers carry their loads ahead, the botanists and field men concern themselves with the main work of the expedition. If the geographical goal is a mountain of difficult access, the inward movement of most sup-



Dr. Thomas R. Soderstrom and Dr. Gerard Wessels-Boer are preparing plants for the presses. Dr. Soderstrom is a grass specialist, Dr. Wessels-Boer a palm specialist.

Lucie Rivier, a rocky river island in Zuid River, Suriname. Cactus trails over the rock at right, clusia grows nearby.

plies and equipment will terminate at a base camp, from which the botanists and field men will move on in a series of short forays, setting up "fly camps" as they ascend.

Before this assumes the sound of a pat routine, let me say what must be obvious—that no two expeditions are alike and that no two people will run one the same way. Each venture brings to light its own problems, and these are solved according to the resourcefulness and experience of the responsible members.

On all these expeditions we strive toward what must certainly seem like an impossible goal: to collect specimens of all flowering and/or fruiting seed plants—trees, shrubs, and herbs—in as many different habitats as possible. We must ignore the appellation "common" or "weed," because hardly any species present is adequately represented in our herbaria. Indeed, the commoner plants are often the least well accounted for in herbarium collections. Further, we collect each specimen in many replicate sets, often ten, sometimes even more. Like the exchange of publications among learned societies and libraries, herbaria exchange specimens, and these replicate sets furnish our institution with raw material in return for which we receive similar amounts of material from other institutions. Thus, if on an expedition we collect two thousand numbers embracing, say fourteen thousand specimens (that is, an average of one original plus six replicate specimens per number), we have about twelve thousand specimens for exchange. Since our exchange program is carried on with many different institution, we stand to receive in return twelve thousand different specimens. Thus, one of the fringe benefits of an expedition is the substantial addition of new specimens to our herbaria from all over the world.

In addition to the collection and preparation of herbarium specimens, we make special collections. Vials of preserved flower buds in varying stages of development are turned over to cytologists for the determinations of chromosome numbers, data which help to determine genetic relationships and possible origin. These same collections, supplemented by packets of dried flowers, also serve as raw material for the preparation of pollen slides by palynologists. Blocks of wood, taken from trees in such a way as to include sapwood and heartwood, are passed on to wood specialists. Their studies contribute not only to the development of a better classification but also to possible economic use of these woods. Five to ten kilograms of dried leaves and bark from selected species are handed over to pharmaceutical firms for special analytical study. These firms are also interested in soil fungi, and to help with this line of investigation we make numerous collections of soils from varying depths in different habitats. Mass collections of dried flowers are analyzed by biochemists who search for still additional characters to be used in problems of classification. Seed collections are made and eventually serve not only as supplementary materials in classification studies but also as sources of new horticultural items for greenhouse culture. Special collections are also made of fungi and bryophytes. Photographs are made, both to record the geographical features of these little-known regions and to record plants, in whole or in part, in their natural settings and precollection posture. It is apparent, then, that many interests are served by tropical

Very low water at height of the dry season, in October, 1960, in Rio Oiapoque, Amapá.

botanical expeditions—some scientific, some economic, some aesthetic.

To serve all these ends and, at the same time, not lose sight of the main objective, careful organization is required. The leader's delegation of responsibility is essential but no more so that the effective assumption of responsibility by other principals in the group. In short, many things are going on at the same time. Work days in the field average about fourteen hours each and—there are no Saturdays, Sundays, or holidays off.

The first one up, at 4:30 or 5 in the morning while it is still dark, is the cook, usually a local man hired for the purpose. He is followed at dawn by everyone else. By 7 o'clock

Dr. Howard S. Irwin, leader of the expedition, and Nunes. The latter, who speaks English, Dutch and Taki-taki, served as the foreman of the field men.

Dr. Irwin, Noel Holmgren, Dr. Ghillean Prance, and Dr. Sodestrom with their plant presses in camp at Kayser Airstrip, Suriname.

or so we have finished oatmeal and coffee and make ready to leave for the day's collecting. Sometimes, if three or four botanists are in the party, we keep a rotating roster by which one remains in camp to go through the presses put up the previous night, package the dried specimens, mix liquid preventatives, attend to the special collections, and thus prepare for the material to come in that day. Sometimes one of the field men stays in camp to clean and refill the pressure stoves, trim wood samples to a common size, bale up leaf collections, or perhaps repair motors and boats. The botanists go out singly or in pairs and are accompanied by one or two field men.

In much of our hunting we must stand at a distance, looking up into the phyllotactic patterns of the overhead canopy, searching for other patterns we have come to associate with inflorescence, flower, or fruit. Binoculars have a use here, although it is limited, for most of what we see is in silhouette. At the same time we scan the lower levels for shrubs or herbs which may be fertile, and especially we survey the brown, leafy ground cover for tell-tale evidence of floral activity above: a withered corolla, a bundle of united stamens, a beak-bruised fruit, a brightly colored seed. Most commonly the field men will be called upon to fell trees and cut out wood blocks, and sometimes, if they are able, to climb trees for specimens, not only of the tree itself, but also of lianas (woody vines) and epihpytes on its branches or on those of accessible neighboring trees. Felling trees is often destructive to desired specimen material, resulting in torn leaves, broken inflorescences, and detached, bruised fruits. It is also frequently time-consuming, for a tree in close association with others, bound to them with lianas, may be difficult to bring down without cutting several others in the immediate vicinity. But trained climbers are not easily found.

Specimens are wrapped in newspaper to keep them separate, then loaded into duffel bags, one or two of which are borne by each member of the groud. The specimens are usually collected in excess of our desired goal of ten replicates per number, for this allows us to be selective back at the camp where actual preparation will take place. Cytological collections are taken immediately as a flowering branch is cut or, if it is accessible, even before. The additional flowers

in our excess will serve as a source of palynological material for pollen slides. If the plant of the moment is in fruit, additional fruit collections are taken; if the fruits are ripe or nearly so, they will serve as a source of seeds.

In spite of the fact that we are fairly omnivorous about collecting whatever appears to be in flower or fruit (or, with the lower plants, otherwise in a fertile condition), we exercise judgment based on botanical training and experience. According to his experience, the botanist develops a sense of the completeness of the inventory in a given area, a sense of whether the area is yielding a higher than usual proportion of seldom-seen or unfamiliar plants (the term "interesting" being applied to such plants and such a place), of whether it is time to move on or to tarry. According to the degree of knowledge of the flora, there is an awareness of the possibility of a specimen representing something totally new and undescribed, in which case sets larger than usual are made. There is need to know what will be lost in the transition between the living and pressed states, and hence

what to note as information of potential value to a later student of this plant.

After searching in the forest for several hours, the botanists and their crews return with the day's specimens. If the "take" has been amassed quickly and the area worked not distant from camp, they will return for lunch. Otherwise, lunch will be eaten without ceremony in the forest. In any event, we attempt to return to camp by early afternoon, for much work remains to be done. Field notes, together with additional data, are recorded in the field book. Family and genus names are marked down, but no serious attempt is made to name species in the field. This is best done in the herbarium; the most inauspicious plant, under careful investigation, may turn out to be the real find of the day. Each specimen is given a number, and against that number is recorded everything which will appear on the label with the mounted specimen. Specimens are laid out in lots, the most perishable being dealt with immediately. Material which has wilted badly is placed in shallow water at the shaded edge of the creek. Turgor is usually sufficiently restored in a few hours, or certainly by the following morning. Most material is found to have relaxed somewhat, making easier the job of arranging selected portions in folded single sheets of newspaper.

Along with this phase of the work which, incidentally, is carried out on rustic benches in a palm or tarp-covered field laboratory, we "build" the presses. Each press consists of two heavy lattice frames, each measuring about sixteen inches by twelve inches. Between the lattices are stacked sheets of blotting paper and corrugated aluminum sheets, on a two-for-one basis; then between each two blotters is placed a folded single newspaper sheet with its carefully arranged specimen. Thus the press is built up in this sequence: lattice frame, blotter, newspaper, blotter, corrugate, blotter, newspaper, blotter, corrugate, blotter, newspaper, blotter, corrugate, and so on . . . blotter, lattice frame. The number of specimens which are put in a press varies with their thickness, but generally a press is built up to about five or five and a half feet and may contain seventy-five to one hundred specimens. The entire stack is compressed by means of two heavy webbing straps, each with gripping buckles. The straps are pulled down alternately with all the force we can muster until the press is about four feet high. Often one man sits on the press while another cinches the straps. Such a stack of material would prove awkward to manage if we attempted to handle it without support. To obviate this problem, we smooth a small area of ground, perhaps a square yard, just inside the laboratory, placing a couple of logs parallel about fifteen inches apart, their long axes about 5° off horizontal. At the low end we set up two poles which are lashed against the framing of the shelter, also about 5° off perpendicular, so as to form a right angle with the logs on the ground. A press, then, is built upon the tilted logs and, as it rises, leans against the poles. When the "high-water" mark is reached, the press is bound up, placed about two feet over a gasoline pressure stove on a supporting open-topped enclosure which directs all heat upward into the vertically arranged corrugations. In the press, water passes from the specimen through the newspaper, through the blotter, and into the upward-moving current of hot air in the corrugations. Within eight hours most specimens are dry; those that are not are included with fresh material in the next load. In general, grasses and sedges dry within a few hours; bromelaids, orchids, and other succulents may take several days. Thus, as an economy measure and whenever feasible, materials are segregated in different presses according to the estimated drying time.

With three or four botanists working it is possible to prepare one press per hour and, as a rule of thumb, it has seemed reasonable and practical to have as many presses along as there are botanists. The actual time varies, of course, with the nature of the material. Leaves, petioles, and inflorescences of large bromeliads and aroids must be sliced or "skinned" on one side to expose the water-saturated parenchymatous tissue. The same must be done to the pseudobulbs of orchids, although it is sometimes possible to slit these and scoop out the pulpy interior. Bulky fruits of the hard, dry type are set out in the sun to dry; fleshy ones are preserved in alcohol.

During the afternoons the field men often take up fishing line or rifle and try to augment our rice-based diet with local fare. They seldom return empty-handed. While they are out, the cook gathers up firewood, coaxing the drier pieces to support flame and adding the wetter ones as the flames mount. The hunters and fishermen return, proudly displaying the catch. To the basic rice may be added tapir, deer, agouti, capybara, bush fowl, even alligator, or any of a dozen or more kinds of fish. What a delectable dish! Simple but always appetizing. After coffee the pressure stoves are pumped up and plans are laid for the next day. A dip in the creek, a little friendly bantering and quiet reading, then into the hammocks. Our fatigue is genuine; for despite our organization and labor-saving measures, collecting in the Guiana forests, as in rain forests elsewhere, is carried on at great expense of energy.

So the days pass. To the higher, less accessible elevations, short two- or three-day trips are made, each day's collection being wrapped in plastic and sent back the next morning to the botanist who is left in the base camp. Supplies are moved up from the river camp; packaged dried specimens are taken down on the return. The diminishing food store is more than replaced by the increasing quantity of collections. Everything must be carefully tagged and packed. Everyone keeps busy and everyone senses a feeling of accomplishment —if all has gone well.

Numerous hazards are met in this kind of work, but most are not peculiar to "jungle." Disease is important, and we certainly cannot ignore the tropical parasites. But the rewards of recent advances in medical science are as applicable in the tropics as in temperate-zone areas. Malaria, yellow fever, dysentery, insect bites, and superficial fungus infections are controlled in nearly all people. In rare instances cases of snakebite may be beyond field treatment. Only intestinal worms prove difficult, but this is more the result of the incapacitating effect of strong vermifuges than for lack of drugs. I prefer to keep my worms until the close of field work; they seldom cause undue discomfort.

Contrary to popular belief, enough is known to make tropical areas as free from infectious disease as any other part of the world. Application of this knowledge is commonly difficult, mostly for economic reasons, but it is possible. Europe in the fifteenth and sixteenth centuries was as

unhealthful as any region in the tropics today—this should give pause in making sweeping generalizations about geography, climate, and disease. Twentieth-century coastal British Guiana, a heavily populated place, is as healthful—for Caucasian and indigenous peoples alike—as Bronx Park. The backland rain-forest areas are singularly disease-free because of the absence of concentrated human populations.

"Accidents will happen," we say with resignation, and to a point this cannot be denied. When the sum of medical resource is a small, portable pharmacy and a few medically untrained expedition leaders, it behooves all to exercise caution. An eight-inch gash in the leg, inflicted by a carelessly wielded machete, can be rendered aseptic and sewn up; but the victim must not only retire from our work force, he becomes a burden to all.

More serious than disease or accident is personal relationship. It is a well-understood psychological phenomenon that when persons, especially those of diverse background, are in prolonged contact with each other, inter-personal frictions mount. In the field this seldom reaches serious proportions for several weeks, and sometimes presents no problem at all. But the "natives" (a universally distasteful term) must be accepted for what they are. Their numbers are small and their relationship with the dominating forests is harmonious; their behavior deviates from our accepted norms; their environment has different meanings for them, and they in turn have quite different effects on that environment, very different from those we have on our environment. In short, we deal not only with plants on our expeditions but also with people, and an understanding of them is essential to any kind of success. The sahib-coolie relationship between explorer and hireling is a thing of the past. Today men everywhere want to be dealt with as men—as human beings, we are wont to say—and this is very nearly as true on the liana-festooned banks of the Rio Oiapoque as on the concrete plazas of Main Street, U.S.A.

To deal with this problem in blunt terms, we must not lose sight of the fact that, regardless of the benefits we and our collaborators may derive from an undertaking which only we can carry out, we are guests in a host society and to that extent at least are obliged to respect the customs of that society. On the other hand, those of the host society who choose to work with us must understand our need for loyal, reliable service in the period of field activity. Naturally, differences of opinion do arise, and upon the manner in which they are resolved depends the character of the expedition from that point forward. Hasty, arbitrary judgments by a principal are made with increasing risk. The problem may be one of "drawing a line" or "maintaining distance" or even "biting the tongue," and it is compounded by the European (including the North American) who has been convinced for the last several hundred years of his belonging to a superior race embracing a superior culture. It is abundantly clear, however, that the once successful manipulation of arms, economics, and politics has begun to backfire. Still, on the level of the individual, the European intruder in tropical cultures often finds himself in an unaccustomed and uncomfortably high status—a facet of a problem familiar to managers of foreign enterprises throughout the tropics, one which sometimes leads to serious psychological troubles.

Narrowing this problem to our own operations, the very nature of botanical expeditions tends to minimize the urban-centered problem of artificial status inflation, for everyone must participate actively in the physical work of the operation. In a sense, it is we, the intruders, who make the greater adjustment, who "go native." This is not to say we adopt tribal customs, wear loin clothes, and tap rubber trees, but rather shed a good deal of the "white man's burden," the burden of our own civilization, and adapt such cultural phenomena as food, housing, and clothing to suit the conditions at hand. On the personal level, nothing augments the harmonious and efficient progress of an expedition more than a high level of rapport between principals and field men, gained through shoulder-to-shoulder work, relaxed conversation, sharing of plans and common food. There results a unity of action, a feeling of mutual responsibility, a warm camaraderie which relieve expedition leaders of the time-worn and wholly undesirable role of top sergeant. Crossing a language barrier, however imperfectly, is an important first step, one which many visitors from the North fail to make.

With the stage properly set, emotional involvement, imperceptible at first, but real, can develop. I am convinced that for me it is a necessary concommitant to a productive expedition. At the close of an expedition there is sadness, sometimes exchange of gifts, and even a tear or two. On returning to New York and to the Garden, I find myself unable to fully settle down for two or three weeks. The transition between the two modes of existence is sharp; accommodation takes some time.

I consider it a privilege to have had the opportunity of participating in some of the Garden's tropical expeditions and am, of course, indebted to Dr. Bassett Maguire on whose efforts all of our recent tropical work has been based. I now look forward to continuing this work in a new venue, in the highlands of central Brazil.

TWO BAHAMIAN EQUITANT ONCIDIUMS

Part I—*Oncidium lucayanum*

By LINCOLN ADDERLEY

Mr. Adderley, a gardener, takes care of the orchid collection at The New York Botanical Garden.

WHEN I LIVED AND WORKED in the Bahamas the emphasis was on the more exotic material—both in orchids and tropical foliage plants. The conventional cattleya, phalaenopsis, cypripedium, and so on were the order of the day. The less-known or "insignificant botanicals" were left pretty much alone. However, when I realized that I was definitely going to leave the Bahamas for the United States, I tride to study as many of the native orchids as possible, but time did not permit trips to the outer islands—as we say in the Bahamas —where many of these orchids abound. I covered the Island of New Providence, capital of the Bahamas, pretty well but was not successful in finding the two

orchids I wanted most to find, *Oncidium bahamanse* and *Oncidium lucayanum.*

In May, 1962, my wife and I were guests of very good friends in Nassau, who decided to let me have their boat for a week. The boat, a sixty-one-foot yacht with two diesels, is equipped for fishing and comfortable living. My wife was elated at the thought of a week's cruise through the beautiful Bahamas; and I was convinced that it would be the most luxurious orchid hunt ever undertaken. I contacted a friend, John Patterson, who knows the Abaco area pretty well and who was sure that *Oncidium lucayanum* could be found there. It was arranged that he with his wife and two young sons would join us on the trip. So after checking things out with the captain as to what we needed, and when everything was ready, we sailed out of Nassau's harbor bright and early on a beautiful morning in May.

After we had cruised five or six hours from New Providence, we sighted the Abacos. Our planned destination was the Angel Cays—most of the larger islands are surrounded by smaller islands and cays—and we sailed into a suitable harbor late in the afternoon. As soon as the yacht was tailing correctly, John and I asked the mate to pull up the Boston whaler, which is fine for the shallow water near the smaller islands. I carried a machete and off we were to the nearest island. John and I tramped from the north side of the small island to the south side through a magnificent piece of jungle—for the Bahamas. There were no orchids in this forest—we expected none, for orchids are rarely found in this type of dense forest growth. Like the chickens crossing the road, we just wanted to get to the other side. On the south side, where the growth is stunted and light filters through, we saw many orchids and bromeliads but only a few specimens of little *Oncidium lucayanum.* Nevertheless we waded to the other side of the island, where we were to be picked up later, and in the meantime collected shellfish for food.

Aftr supper we discussed plans for the following day. John and I were to take the Boston whaler around the island to a cove where we could follow an old trail used by the lumbermen, hunting as we walked to the south shore of the island. The captain would move the yacht later— and the women and boys could fish!

The *O. lucayanum* hunt was on. Armed with machetes and baskets we took off along the trail, diving in and out of the bush at likely spots. These plants are so small that one has to have the eyes of a hawk to discover them without flowers, for they nestle against the branches and twigs of the trees on which they grow. At an opening, where there were many potholes (large cavities in the soft coral rock), I went into the bush. When I got into the middle of this area I said to myself, "If there are orchids anywhere, they must be in here." I dug in a little deeper and then suddenly my eyes caught what I was looking for. I was among *Oncidium lucayanum.* To my friend somewhere in the area went the wild shout of a find. This is always the exciting moment in the field for the orchid hunter. It doesn't matter if the plants are bearing flowers or not. Of course, if there are flowers, it adds even greater excitement. There were literally thousands of these tiny oncidiums. A single shrubby tree had hundreds clinging to its slim branches. Unfortunately the plants were not in flower; it would have been an excellent opportunity to study the variation in this species—for its is indeed variable.

Oncidium lucayanum.

Standing in the midst of these plants I tried to figure out what it is that enables them to grow in rather localized areas and not in other areas seemingly not too different. After a little observation it became apparent. This oncidium grows on small cays or islands semi-isolated from the mainland. It perches on trees and shrubs only a few feet above the high-water margin and bordering on the mangrove *(Rhizophora mangle)* swamps. During the high tides the potholes become filled with water and remain that way during the flood tide, which occurs twice in the twenty-four-hour period. This means that there is a ten-hour period when water stands in these potholes and the ground never dries out; too, the warm moist air blowing across the open swamps constantly brings the needed moisture to these little gems. So I am led to believe that the evaporating water from beneath and the moist air from across the open swamps, responsible for the constant high humidity, are the determining factors.

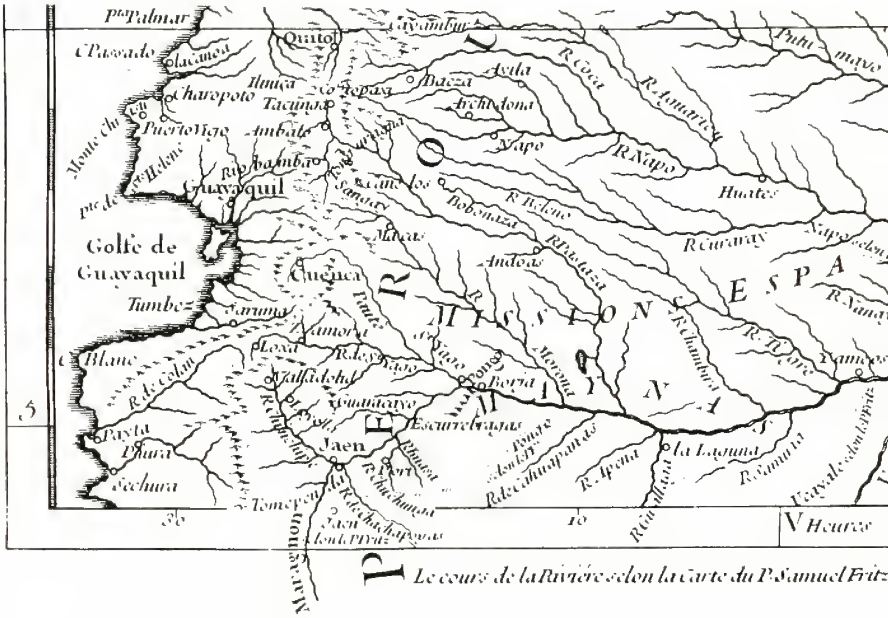
Onicidium lucayanum is a miniature equitant with arching, shallowly channeled leaves serrated along the margins and sparsely spotted with minute purple-brown spots throughout. The size of the plant varies considerably, depending on exposure to light. I have seen flowering plants about one inch over all, and the largest plants with leaves from two and one-half to three inches long. The inflorescence is quite large for the size of the plant, being from six to eighteen inches long with from six to twelve or more flowers. This species is so variable that it is difficult to find two clones with exactly the same flowers. Here at The New York Botanical Garden I have since flowered three clones, and each an entirely different color form. One of my favorite forms has sepals which are greenish yellow barred and spotted

(Continued on page 154)

BOTANICAL EXPLORATION OF THE MARANON RAIN FORESTS

By J. J. WURDACK

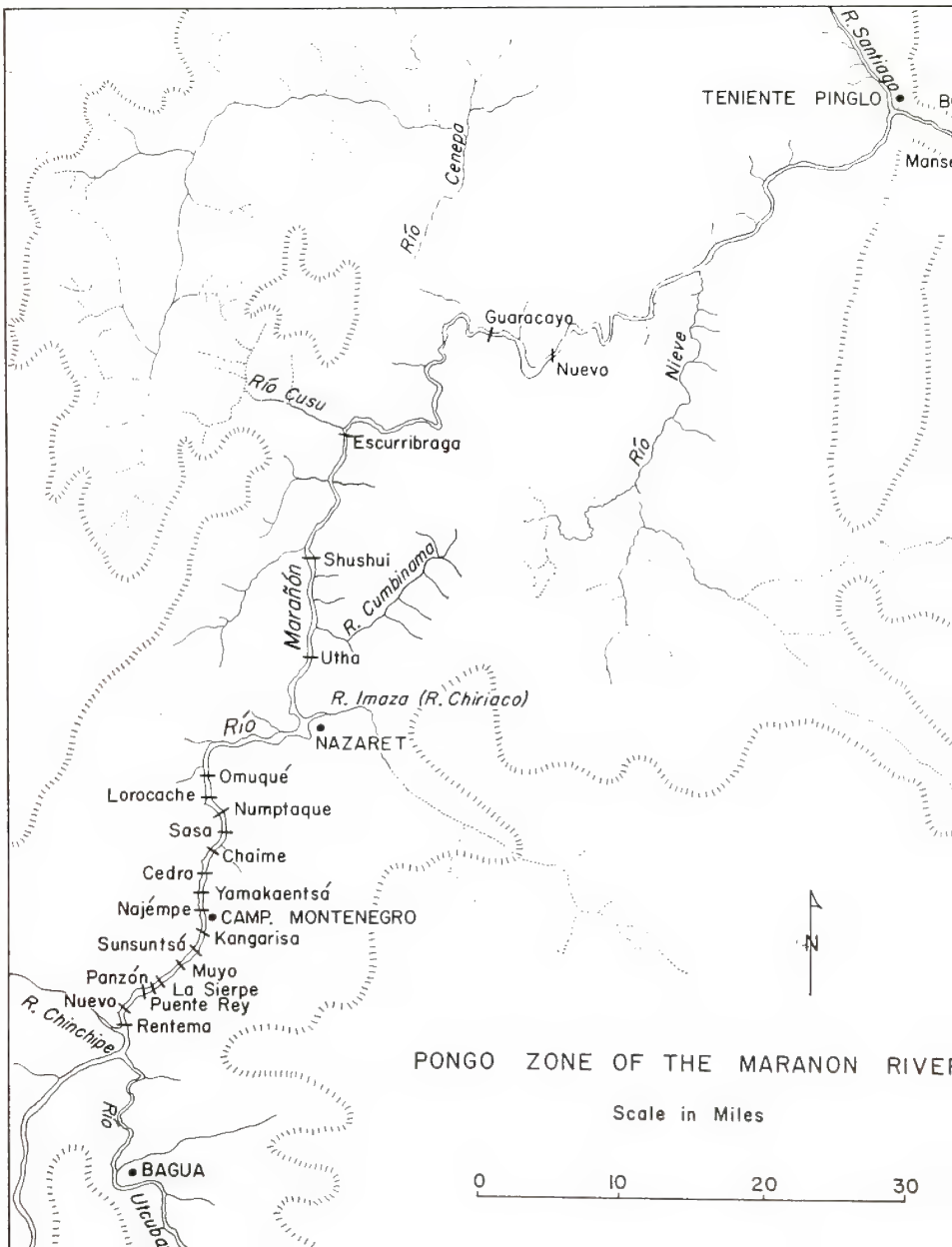
Dr. Wurdack, Associate Curator in the Department of Botany at the United States National Museum, visited the Marañón rain forests from September to November, 1962. He descended the river from Montenegro to Borja and then to Iquitos. Plant specimens were collected near Montenegro, in the riverine forests at Pongo de Manseriche and the lower Santiago River, and on the lower and middle slopes of the Cerros Campanquiz; the collections made in the *pongo* zone, a total of seven hundred and thirty field numbers, are now being studied. The field work was assisted by a grant from the National Science Foundation.



Above. The Marañón River, as depicted in La Condamine's map of the Amazon published in 1746.

TO A PERSON aware of the known versatility of the plant kingdom and the current gaps in classificatory knowledge, two major areas on the earth's land surface remain as primary challenges. The "Lost World" mountains in northern South America are the foremost unknown region; the second rewarding locale is the Amazon Basin, especially the western periphery along the moist eastern slopes of the Andes. These two areas are less known botanically than the combined remainder of the world's emersed surface. The subandean forest has been breached often along a few routes: Villavicencio and the Caquetá-Putumayo drainage in Colombia, the uppermost Napo River in Napo-Pastaza, Ecuador, and the Huallaga and Ucayali Rivers in Peru. Other single forays have been those of Rusby along the Beni River in Bolivia and W. H. Camp in the Cutucú region of Santiago-Zamora, Ecuador; both probes were by botanists associated with The New York Botanical Garden. Still another gateway of limited exploration has been the Marañón River in Peru. Apart from this small sampling, sufficient only to tantalize a taxonomist, the two-thousand-mile arc along the eastern Andes is essentially unknown.

The first complete transect of the Andes and the entire South American Continent was during Orellana's myth-generating trip of 1539-1541. However, the firm basis of Amazonian cartography started with Charles-Marie de La Condamine's descent of the river in 1743 at the conclusion of the scientifically rewarding but personally tragic expedition of the French Académie des Sciences. La Condamine's trip through the Marañón *pongos* was the first for accurate recording of geographic positions; the Quito-oriented Spanish had preferred the more direct routes along the Napo and Pastaza Rivers in traveling across South America. Starting from Ecuador, La Condamine reached Jaen de Bracamoros in northern Peru in June, 1743, after the descent of the Chinchipe River; the town, near the upstream edge of the Marañón rain forest, had been founded in 1549. From Jaen, it was



Left, dry-climate vegetation on the hills near Pongo Rentema and, right, rain forest near Pongo Lorocache.

a four-day walk to the port of Chuchunga, near the present-day town of Nazaret, for embarkation on a balsa raft on July 4. After some riverine difficulties, Borja was reached on July 12. La Condamine then continued down the Amazon, reaching Belém, Brazil, on September 27 and—after a ten-year absence from Europe—Paris on February 23, 1745.

At the time of La Condamine's voyage, the Spanish province of Quito was divided into four "governments," the southeastern jurisdiction being Maynas. Borja, the capital of Maynas, was founded at the downstream end of the last of the Marañón rapids by Don Diego Baca de Vega in 1634. Just above Borja, the Marañón is choked through a gorge about fifty yards wide (a ten-fold decrease in river width) in the Cerros Campanquiz. La Condamine noted the swift current (about nine miles per hour) and rapid river-level fluctuation (twenty-five feet fall in thirty-six hours) at the narrowest part of the *pongo*. The extreme dry-season variation is undoubtedly due to the small, sodden drainage area of the Santiago River, which enters the Marañón just above the Cerros Campanquiz. The long, mostly rather dry basin of the Marañón proper is less subject to the caprices of heavy transitory rains. After a visit in 1925, Singewald described the physiography and geology of the Manseriche canyon; he postulated the time of the orogenic movement of the Cerros Campanquiz as late Miocene.[1]

The word *pongo* is a corruption of an Indian word meaning gate or door. Between the beginning of the rain forest, just below Pongo de Rentema, and Pongo de Manseriche are twenty other named zones of rapids. These *pongo* names, mostly of Aguaruna dialect derivation, are like highway route numbers to the balsa raftsmen of the Marañón. There are two Pongo Nuevos, the downstream one having been formed quite recently by a landslide. The hazards of individual *pongo* passages along the Marañón vary with river stages and generally are much exaggerated. An experienced *balsero,* such as Miguel Mitidieri of Montenegro, minimizes the reported adventures of "explorers" as either imaginary or the result of inexcusable carelessness. Of all the Marañón rapids, only Manseriche in flood is considered impassable; indeed, the Peruvian army garrison at Borja does not permit river transit when the depth gauge indicates flood height. During flood periods Manseriche can be by-passed on a foot-trail; during lower river stages, water transit of the gorge is quite facile.

Beginning with Aimé Bonpland, a succession of botanists has visited the upstream edge of the Marañón *pongo* zone during the nineteenth and twentieth centuries. Bonpland, accompanying Humboldt, arrived at Pongo de Rentema in August, 1802. During the seventeen-day stay, Humboldt made longitude and river width measurements, while the botanist collected plants along the "Amazon." (In present-day geographical nomenclature, the Peruvian Amazon is formed by the junction of the Marañón and Ucayali Rivers just above Iquitos). From Rentema, Humboldt and Bonpland returned to the Pacific Coast of Peru. August Weberbauer briefly visited Jaen at the end of April, 1912. Within the last five years, Ramón Ferreyra, Paul Hutchison, Felix Woytkowski, Claudine Friedberg, A. Lopez Miranda, and A. Ságastegui have spent brief periods at the rain-forest edge below Pongo de Rentema; however, as yet only a sketchy sampling (especially deficient in upper canopy trees) of the flora has been obtained. Dr. Friedberg has extensive (but as yet unpublished) notes on the useful plants of the

A balsa raft loaded for the trip through the *pongos*.

Ombrophytum peruvianum, a parasitic flowering plant without chlorophyll, from the forest floor on the slopes of the Cerros Campanquiz.

Blakea portentosa, a vining melastome known only from the Cerros Campanquiz.

Aguaruna Indians. All the very recent visitors have used the road being constructed by a Peruvian army engineer battalion to eventually connect the west coast of Peru (via Olmos and Corral Quemado) with the navigable river below Borja. The unpaved all-weather road is presently completed to somewhat beyond Pongo Najémpe, with a permanent construction camp, Campamento Subteniente Montenegro, nearby.

The downstream end of the *pongo* zone has also had only very limited botanical exploration. The first, and still most thorough, collector was Günter Tessmann. Tessmann's primary interest was ethnology and his book, *Die Indianer Nordost-Perus*, is a standard reference. His botanical field work was also outstanding. After ascending the Marañón, he stayed in the Manseriche region from August, 1924, to January, 1925, collecting slightly over one thousand numbers (Nos. 3487-4869) of plants. His sampling of the flora of Amazonian Peru, both in the Marañón and Ucayali drainages is notable for the number of large tree species represented. Since such a high percentage of tall trees in the flood-free rain forest has very hard wood, felling time to obtain specimens is lengthy and also complicated by entangling lianas "hanging up" the trunks after axing. The usual alternative (apart from the rather unsatisfactory method of shooting down branchlets) is climbing by an agile woodsman; however, this method, hazardous and time consuming, often (on the largest trees) results in rather fragmentary material. Tessmann's collections are thus truly remarkable. Probably the most complete extant set of his specimens is deposited at The New York Botanical Garden through the courtesy of Dr. Harvey Bassler (who also sponsored the publication of Tessmann's Indian studies).

During the Smithsonian Institution-New York Botanical Garden expedition to Peru, W. J. Dennis briefly visited Pongo de Manseriche at the end of August, 1929. His total collections for the trip along the Marañón and Amazon from Iquitos were 131 numbers, of which twenty came from the lower end of Manseriche. A remarkable woman, Mrs. Ynes Mexia, who also covered many other parts of tropical America, stayed at Pongo de Manseriche from November 13, 1931, to January 5, 1932. She collected over two hundred and fifty numbers (Nos. 6132-6383), mostly of the understory and small tree species. Mrs. Mexia ascended the Amazon from its mouth up to Iquitos and thence up the Marañón. No botanist has visited the Manseriche area during the February-July half of the year.

The vegetation of the narrow valley of the Marañón throughout the *pongo* zone is a luxuriant display of unusual species. Particularly notable, especially toward the upstream edge of the rain forest, is the abundance of ferns and fern allies, a feature not found to the eastward in the Brazilian Amazon forest nor in the Orinoco lowland *selva*. Generally the *pongo* zone flora, along with the plants of other subandean regions, is related to that of the Amazonian rain forest, but with many distinct genera and species. Probably the distinctness is a response to the higher rainfall, usually in excess of one hundred and fifty inches. A vivid description of this forest in northeastern Ecuador and adjacent Colombia has been given by Arnold Schultze-Rhonhof.[2]

Of even greater botanical interest are the plants on the low ridges forming the Andean outliers. The collections from the few of the mountains thus far visited have indicated extraordinary endemicity. The floras of these hills are known mostly from a single botanical trip. Spruce collected on Cerro Campana, west-northwest of Tarapoto, in 1855; Ule visited Escaler (on the divide between the Cainarache River and Tarapoto) and Cumbasso (near Tarapoto) at the end of 1902 and beginning of 1903; Camp ascended the Cordillera Cutucú, in Santiago-Zamora, Ecuador, in 1944. For the Cerros Campanquiz on the Marañón, only a limited sampling of the slopes up to an elevation of seven hundred and fifty meters has thus far been obtained.

In Pittsburgh, Pennsylvania, twenty-five years ago and in Beltsville, Maryland, today, a popular winter's evening sport has been the study of Geological Survey quadrangles for in-

The Marañón gorge at Pongo de Manseriche.

dications of small, botanically unvisited bogs in Pennsylvania and Vermont, with likely clues being such stream names as Glade Run. The parallel study of South American maps does not require the ingenuity and attention to minutiae needed in eastern United States. For planning the itinerary of a profitable botanical trip to South America, only a knowledge of previous field work, a disenchantment with roadside collecting, and a willingness to walk some distance are needed. Anyone familiar with the past peregrinations of the efficient tropical collectors can easily avoid duplication of geographic coverage and significantly advance the knowledge of the world's plants. Great stretches of undisturbed unvisited subandean rain forest remain for the imaginative botanist.

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TREASURES OF THE GARDEN'S HERBARIUM III

The Bryophytes of William Mitten

By Mary Fleming and Rupert C. Barneby

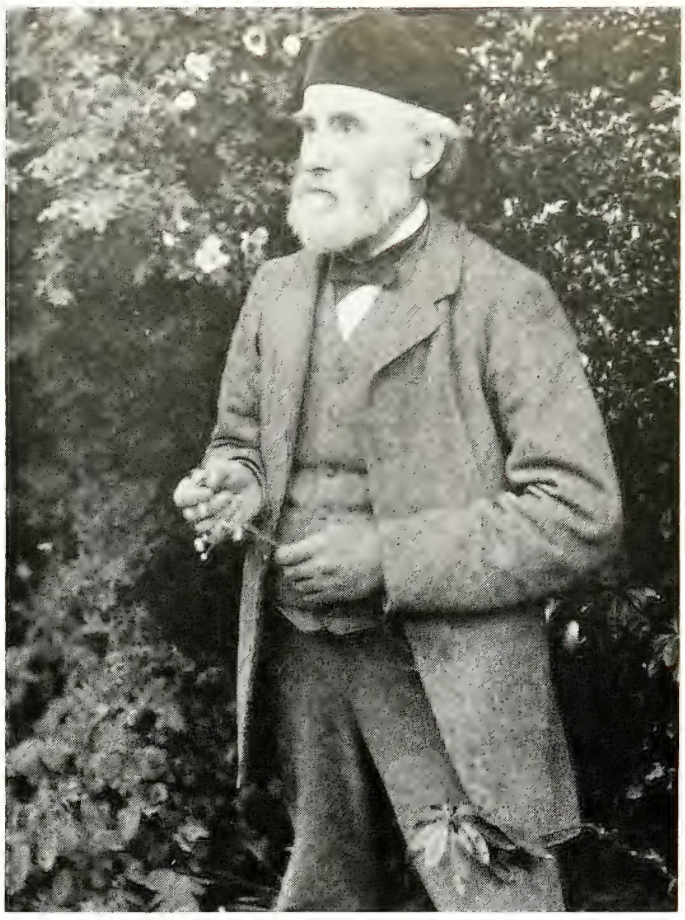
Mrs. Fleming is Technical Assistant in the Cryptogamic Herbarium. Mr. Barneby is Honorary Curator of Western American Botany.

The lives of scientists in general and of botanists in particular are often barren of picturesque biographical interest. The botanists best known to the world at large are the explorer-collectors for whom botany was never an exclusive interest, men of the stature of Père David, Meriwether Lewis, or Joseph Rock, each of whom opened up a hitherto unknown corner of the earth. It is seldom that a naturalist of note has become, like Tournefort, an ambassador for a great power or, like Humboldt, a confidant of princes. The triumphs and defeats of intellectuals belong in the realm of ideas; no doubt about it, their lives as seen from without are often humdrum affairs. Darwin spent tranquil decades contemplating the earthworm's humble mysteries and the wattles of domestic fowl. William Mitten, the bright-eyed old gentleman in the velvet cap whose portrait accompanies this note, once told Sir William Hooker that in five years he had spent only two weekdays away from his Sussex home and business—the occasion was a trip to London to visit the Great Exhibition. Nevertheless, at his death in 1906 Mitten was acknowledged as the leading bryologist of his generation. Through quiet persistence he had accumulated an enormous collection of mosses and hepatics, the largest and most important, probably, that has ever been in private hands. For nearly sixty years the Mitten collection has been one of the Garden's most valuable and cherished possessions.

William Mitten[1] was born in 1819, and except for one holiday in Switzerland he spent his entire life in England, most of it in and near his birthplace in rural Sussex. In youth he was apprenticed to a pharmaceutical chemist, and in due course he acquired his own chemist and stationery shop in the small country town of Hurstpierpoint, a business which supported him and his family of daughters in modest but apparently comfortable style and gave him a limited freedom to pursue his studies of mosses and liverworts. Mitten's interest in the bryophytes came early. It is told that during his apprenticeship the vials which ostensibly harbored the trochees, powders, treacles, and other items of the Victorian pharmacopeia were sometimes found to contain specimens instead. When he became his own master, Mitten was often obliged to snatch a moment here and there, between waiting on customers and making up prescriptions, for a rapid analysis of some mossy fragment. It was in these moments, stolen from a prosaic daily round and added one to another over a long, uneventful life, that Mitten's botanical legacy was put together.

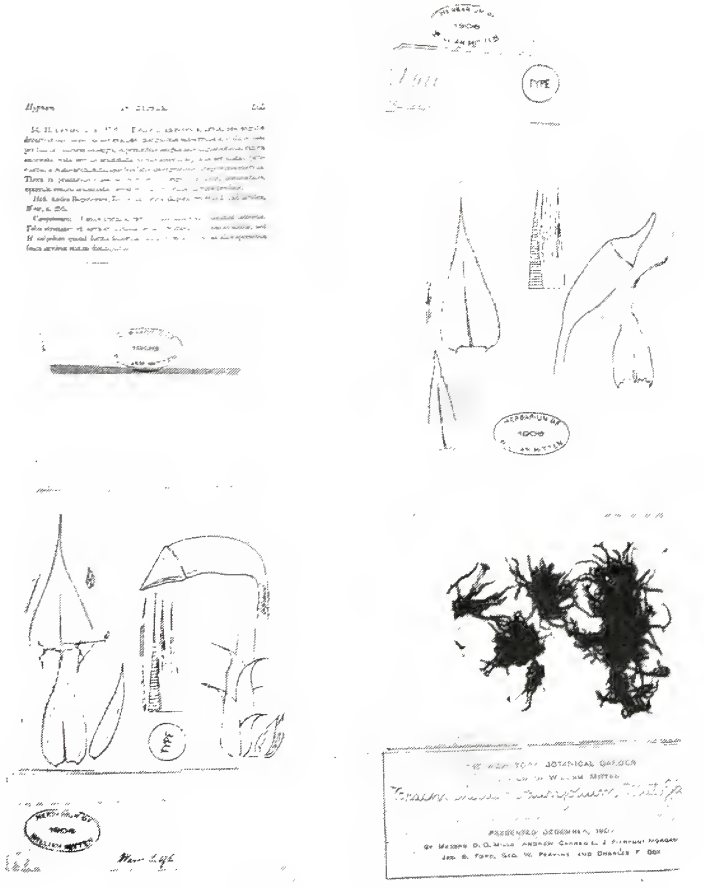
Mitten published his first paper in 1846—he was then in his twenty-sixth year; by 1848 he had established a cordial correspondence with Sir William Hooker. This connection was crucial to his career. Between 1848 and 1891 almost all the mosses and hepatics which poured into Kew Gardens from the four quarters of the globe were passed on to Mitten for sorting, packeting, distribution, and identification. This was the period when the Hookers and George Bentham were moving their agents like chessmen over the map of the world (and especially, of course, the parts of it colored imperial red in English atlases), the era when collectors were laying the foundation for the series of colonial floras undertaken by the Kew botanists. An incomplete list of individuals and of the expeditions, some sponsored by government, others underwritten by private subscribers

(often through the agency of the Royal Horticultural Society) from which Mitten acquired sets of material, has been published by Britton[2]. Each continent contributed substantially to Mitten's collection; here we can only mention briefly some of the larger and more important sources, with emphasis on the Americas. Among the oldest are the Arctic mosses of Ross and Admiral Parry (1819-20), which are said to have come from the herbarium of Robert Brown. Complementing these are Drummond's collection made on the Franklin Expedition (1828), one set of which was originally the property of Sir John Richardson. Drummond's collection from southeastern United States (1841), Sullivant's *Musci Alleghanienses* (1845), Sullivant & Lesquereux's *Musci Boreali-Americani* Ed. 1 (1856), and Bourgeau's material from Palliser's Expedition (1859) are classical items in the Mitten treasury. From Mexico and central America Mitten had material from Martens & Galeotti, from Borgeau, and from Godman & Salvin; from the West Indies and Trinidad mosses collected by Swartz, Charles Wright, Jenman, and Fendler. The collections from tropical South America, particularly those of Richard Spruce from Amazonia and of Jameson from Peru, which contributed so much to Mitten's magnum opus, the *Musci Austro-Americani*[3], are especially noteworthy; those of Glaziou and Burchell from Brazil, of Seeman from the cruise of the "Herald," and the more recent loot from the Transit of Venus Expedition (1874-5) and the Roraima Expedition (1884) are hardly less so. The most important holdings of Old World mosses, on which Mitten wrote extensively, are



William Mitten.

Brachythecium laevifolium (Mitt.) Jaeg. from the herbarium of William Mitten, now in the Cryptogamic Herbarium of The New York Botanical Garden.



those from India. They include the collections of Wallich, Griffith, and Hooker and Thomson from the Himalayas, Burma, and Straits Settlements, as well as those of Thwaites from Ceylon. Lack of space forbids a detailed list of Mitten's sources in Africa, temperate Asia, the islands of the Indian Ocean, Australasia, and Polynesia. From near at home there are plants from Wales and Sussex collected by Mitten himself, and others collected in New York State by John Torrey.

At Mitten's death in 1906 his vast collection, following a directive in his will, was offered for sale to Professor and Mrs. Britton. The money for the purchase, a sum of four hundred pounds sterling (about two thousand turn-of-the-century dollars) was put up by six friends of the Garden. It cannot have taxed their collective resources severely, for three of the benefactors were Ogden Mills, Andrew Carnegie, and J. P. Morgan. Since the collection was estimated by Alfred Russell Wallace, Mitten's son-in-law and executor, to contain some fifty thousand items (the mosses and hepatics in a proportion of about two to one), the specimens cost about four cents apiece. The transaction sounds like robbery today, but the Mitten family were content and grateful, as shown by letters addressed to Mrs. Britton by Mitten's elder daughter Flora. As soon as the sale was arranged, the bryologist R. S. Williams was sent over to England to supervise packing the collection, and to accompany it on the boat to New York. He returned with thirty large packing cases and, as gifts from Flora to the Garden, the portrait of her father which ordinarily hangs in the cryptogamic herbarium and Mitten's own copy of *Musci Austro-*

Americani. Flora Mitten subsequently offered Mrs. Britton her father's botanical library, rich in cryptogamic literature of the nineteenth century. A typed catalog of the books, tentatively (and very modestly) priced, is in the Garden's Library. Apparently some uncommon volumes came to the Garden from this source; but according to a note by J. H. Barnhart in the catalog, the bulk of Mitten's library was dispersed by the firm of Quaritch in London.

When received at the Garden the collection seems to have been just as Mitten left it, and it remains in much the same state today. The specimens of mosses are mounted up to six to a sheet, some loose in small envelopes, others glued down but exposed. Flaps to protect the latter from abrasion while handling are being inserted. Each specimen is labeled in Mitten's small, neat hand, and a large proportion of them are illustrated by analytical pencil drawings of striking delicacy and refinement. Apart from its intrinsic worth as a world-wide reference collection, the Mitten herbarium is of particular value for its type material. In *Musci Austro-Americani* alone Mitten described over six hundred species from South America and the West Indies. A glance at the bibliography given by Hemsley[1] suggests the total number of species which Mitten described during nearly half a century of botanical authorship. As a result the Mitten collection is known to bryologists everywhere and is repeatedly consulted, either in person or through loans and correspondence, by students of mosses in Europe, Japan, India, and indeed everywhere where rolling stones come to rest[4].

1 Standard sources for the life and achievement of William Mitten are the obituaries by W. B. Hemsley in Journal of Botany **44**: 329-332. 1906. and W. E. Nicholson in The Bryologist **10**: 1-5. 1907.
2 Jour. N. Y. Bot. Gard. **8**: 28-32. 1907.
3 Jour. Linn. Soc. **12**: 1-659. 1869.
4 In addition to the collection of bryophytes acquired by purchase, the Garden possesses a lichen herbarium amassed by Mitten and presented to Mrs. Britton by his daughter Flora. Its size is unknown. See Jour. N. Y. Bot. Gard. **19**: 65. 1918.

CONVERSATIONS ON ECOLOGY XI

John Milton, an Associate of The Conservation Foundation of New York, received his undergraduate and graduate training at The University of Michigan. As a result of his contacts there, he has developed a great interest in the preservation of natural areas and the necessity of making ecological studies on such sites. He has made expeditions to Central America and to the far reaches of the Mackenzie Mountains of Canada and has been instrumental in making surveys of sites for preservation.

New York, N. Y.
May 15, 1964

Dear Pierre:

I have just finished reading over letters I through IX of your most interesting series, "Conversations on Ecology." In a recent letter (V) you pointed out that vegetation science must respond to the immediate needs of human populations and at the same time objectively analyze the effects of man's interference upon the landscape. This impresses me as a statement of considerable importance in that it identifies two very different notions of an ecologist's role in defining man's place in nature.

On the one hand, the function of ecology might be to show in a rather detached manner how humanity has increasingly altered the world ecosystem. Man-induced changes in the natural environment have usually degraded the biosphere, as a whole; yet often man has benefited in the short term through simplification of living communities to cycle increasing amounts of necessary materials and energy through his culture.

Another function of ecology is concerned with what is usually called "applied" ecology; here the *management* of plants and animals and habitats is stressed, often in response to pressing problems of resource use. One of the interesting by-products of applied ecology has been the adoption of ecological principles and attempts to comprehend the ecological approach by many investigators outside the field.

It is the latter situation that has prompted me to write you this rather eclectic letter on the *images of ecology* within other disciplines. What are the images of ecology put forth by non-ecologists?

Kenneth Boulding expressed his image of ecology in a recent book, *Principles of Economic Policy*.[1] He views ecology as a discipline-approach which stresses one of science's most unifying concepts: interaction. He specifically mentions inter-species competition, predation, and parasitism; he also comprehends the concepts of ecological equilibrium and short-run stability. "Ecological succession" is described as a process of "short-run equilibrium positions, each of which passes into the next, even though in fact the change may be continuous and no equilibrium ever stays put for very long."

Out of his very simplified view of ecology, Boulding attempts to show how formulation of economic policy becomes the deliberate distortion of an ecosystem in favor of the objectives of the economic policy maker. Ecology is of special value to the economic policy-maker "in that it points up the complexity of inter-relationships and warns against the possibility of getting quite unexpected results."

In 1960, sociologist Walter Firey[2] attempted to outline a new theory of resource use. In developing the theory, he considers three possible approaches to resource situations: ecological, ethnological, and economic. According to Firey, the ecological approach to resource use takes the physical habitat as its point of departure in analyzing and interpreting problems of natural resource management. The ecological frame of reference is "the state of nature in which the plants, animals, and physical features of a habitat are so inter-related as to form an ecosystem: an entity whose chemical elements circulate along regular paths between the organism and its environment. In every ecosystem there exists a more or less self-regulating biotic community, comprised of its own characteristic association (or range of associations) of species, whose survival is only possible in such a community."

Firey concludes that the only criterion of rational resource planning based on the ecological approach is one of permanence, a hypothetical "climax state among organic physical processes." This image of ecology leads him to reject

its relevance to resource use theory as being "something heroic but futile," an inadequate rationale for resource plan-

Political scientist Lynton Caldwell[3] finds in ecology a basis for the transformation of public policy relating to environment which, up to now, has been essentially segmental in its approach. This segmentation, he states, is the natural product of political systems, such as ours, which have developed no clear doctrine of public responsibility toward the natural environment. As a consequence, the need for responsible integration and rational policies toward environmental problems is usually lost in specialized studies of individual problems, often ending in conflicting resource-use judgments. His image of ecology as an integrating tool of public policy is stated as follows: "The natural world, including man and his works, is dependent for well-being and ultimate survival on the maintenance of an equilibrium or balance among the elements of the environment."

Aldous Huxley,[4] in a short paper published early in 1963, concluded in a similar manner: "Ecology is the science of the mutual relations of organisms with their environment and with one another. Only when we get it into our collective head that the basic problem confronting twentieth-century man is an ecological problem will our policies improve and become realistic."

Huxley's image of ecology is reflected in two fundamental questions he poses concerning man's relationship to environment: "Do we propose to live on this planet in symbiotic harmony with our environment? Or, preferring to be wantonly stupid, shall we choose to live like murderous and suicidal parasites that kill their host and so destroy themselves?"

In thinking about these and other images, it seems to me, Pierre, that economics, sociology, public administration, and political science are further removed from the immediate practical problems of environment than medicine, regional planning, conservation, and landscape architecture. In terms of the "feed-back of practical experience to pure science," which you feel vegetation management continually needs, perhaps landscape architecture comes closest to providing this necessary stimulus.

Ian McHarg,[5] Chairman of the University of Pennsylvania's Department of Landscape Architecture, has stressed the need for increased communication between plant ecology, landscape architecture, and regional planning. In discussing a proposed training program for the landscape architect at the University of Pennsylvania, he notes the following: "The introduction of ecology as the basis for regional land planning can only be of the utmost benefit to the orthodoxy of landscape architecture. Indeed, the time has come when it must be recognized that a smattering of horticulture is absolutely inadequate for a professional landscape architect. It should be maintained as a matter of principle that a landscape architect is as good a horticulturist as he is an ecologist and artist . . . This alliance between landscape architecture and the natural sciences, particularly ecology, is planned to produce regional land planning as a primary product, but also to provide a bridge between the natural sciences and the professions concerned with the physical environment."

Similar arguments for the adoption of ecology as a basis for regional planning have been voiced by Arthur Glikson[6] who poses the question: "Can our civilization achieve its objectives only at the expense of its natural environment? It is the science of ecology which can give a rational formulation to what we only felt about the role of landscape in civilized society."

Glikson goes on to define regional planning "as planning for regional ecology, including both nature and society." His image of ecology is based upon Aldo Leopold's idea that structure means the characteristic numbers, as well as the characteristic kinds and functions of the component species. Glikson has attempted to extend this concept to cover human society and the urban, rural, and regional communi-

McHarg's and Glikson's images of ecology, as a basis for regional land planning, extend the application of ecological methods to problems of physical and mental health in the city. In a recent article on this subject McHarg[7] explored the pressing problems of health in the city and the way in which a dynamic ecological approach to planning would provide a more realistic solution. His approach is to view incidence rates of ulcer, lung cancer, hypertension, accidents, suicide, crime, and poverty in both large and small populations as a single problem in relation to regional design. The failure of planners to take this viewpoint in many urban renewal and other programs has tended "to push down one ugly head of pathology only to have another pop up somewhere else." McHarg feels that these high incidence rates can ultimately be lowered for many diseases through use of a broad ecological approach, one which will treat the actual causes of poor urban health beyond narrow symptomatic considerations alone.

The present trend to support environmental health and science programs within the medical field is an indication of a growing cultural awareness of the need to treat the human environment as a whole. This, in itself, is an image of ecology of outstanding importance.

Nevertheless, the most interesting finding, of my quick eclectic perusal of the ecological image came in reading an article by René Dubos on the subject of environmental biology.[8] Dubos evidently has no image of ecology at all, or perhaps he simply wishes to create a new science of similar scope. He discusses the need for an approach to medicine which would go beyond the "purely reductionist approach" in recognizing that organisms respond to environmental stimuli beyond the submicroscopic elements of the microbiologist. Medically, he feels that environmental pollution of the air and water, psychosomatic responses to urban stress, and the burgeoning populations of the city are important problems which environmental biology should face.

What struck me as particularly odd, as it also struck Frank Egler, was this statement: "In contrast [to laboratory research] there is as yet no sophisticated scientific technology for studying the interplay between the whole living organism and the environment."

The challenge which these varying images of ecology, and the lack of comprehension of ecological method, offers to the ecologist is clear. In the past, ecological science has tended to be "artery-hardened" in the sense that you and Frank Egler have so well argued. Ecologists have not been aggressive in the communication of their science to those who want to apply it; those outside the discipline have often had to formulate their own images of ecology with little

actual help or guided comprehension from ecologists themselves.

It is easy for the ecologist to point out the conceptual shallowness and distortion of ecological method by others. Yet how much agreement is there among ecologists as to the "proper" image of ecology? What should ecologists communicate to those fields that want to utilize the tools, concepts and methods of ecology? Ecologists find themselves in a position described by W. H. Auden:[9]

" . we die
Each moment and that each great I
Is but a process in a process
Within a field that never closes;
As proper people find it strange
That we are changed by what we change
That no event can happen twice
And that no two existences
Can be alike;"

Specialists in economics, public administration, political science, sociology, landscape architecture, regional planning, and medicine have only partial images of ecology. Yet, ecology is being changed by the formulation of ecological images within these groups. I see in the varying images of ecology a challenge which we, as ecologists, have not fully met. It is truly our "sin of silence" not to communicate outside our circle, leaving for others what should be our job to help define our own image.

Cordially,
JOHN MILTON

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GARDENER IN HER GARDEN

To my mother-in-law, Helen M. Fox

On the occasion of her eightieth birthday, May 27, 1964

With a trowel in her hand,
she rises smiling from the flower bed:
was it white strawberries,
or primroses, or lilies
she had been planting?

Close by, in the rock garden,
the marble Chinese lady
poises among azaleas and columbine,
where the murmur of hummingbirds' wings
mingles with trickling water.

Stone steps wreathed with jasmine
and pink clematis lead to paths
bordered with santolina and lavender,
blue sage and old-fashioned roses,
whose heads nod day-long, heavy with bees.

Under the protecting brow of the hill,
along slopes springy and sweet
with creeping thyme, petal colors
(mauve, azure, crimson, yellow)
swarm in the sun like butterflies.

She placed them there to grace
the earth with subtle profusion,
and with skillful hands
tends them from year to year,
season to season.

Knowing the rhythms pent in seeds,
the harmonies of soil, sun, rain,
the blossoming songs of each flower,
garlanded she goes, in every weather.

RUTH BERRIEN (Mrs. Henry M.) FOX
Wellesley Hills, Massachusetts

MY FRIENDS, THE WILDLINGS OF THE NEW YORK BOTANICAL GARDEN

By Arthur W. Ambler

Mr. Ambler has taken many excellent photographs of wild flowers, birds and other animals at The New York Botanical Garden. He is a member of the Garden, also of The New York Zoological Society and of the National Audubon Society.

Part V Summer

All green and fair the summer lies,
Just budded from the bud of spring,
With tender blue of wistful skies,
And winds which softly sing.

Susan Coolidge.

The excitement and exuberance of spring gives way to the calm of summer—the season of roses and other floral delights. The woods are in full leaf, the meadows flush, and animals nest to rear their young. With the advent of summer, The New York Botanical Garden is indeed in full bloom.

The part of the Garden discussed in this series of articles resembles the rugged country one finds far from densely populated areas. The architecture is Nature's, and there is no regimentation of living things. Each subject is born and survives or dies according to natural laws. This naturalness creates an enchanting environment where, as I have previously said, city people can find quiet beauty and other intangibles so necessary to alleviate the stress of today's living.

The full canopy of leaves in the woodlands filters the warm sun and provides hiding places for birds and other animals. The Bronx River glides smoothly on, undisturbed by the soft, gentle breeze, and the quiet is broken only by the song of birds and the hum of insects. There is a comforting feeling of peace.

I entered the Garden on a lovely June morning, clear and fresh after an early rainfall. The perfume of flowers was in the air. I saw raindrops on a spider's web, which was woven over the leaves of ivy, sparkling like brilliant jewels in the sunlight. I marveled at the delicacy and intricacy of the pattern of the structure and the capability of the builder, which could build a thing so fragile, yet strong enough to hold many times its weight, the only material being threads of silk produced by glands in its abdomen and the only tools its spinnerts. After photographing the web, I tried to induce the spider to emerge by placing an insect in the center of the web; but the spider was uncooperative, remaining hidden beneath a leaf, waiting perhaps for a prey of its own choosing.

Flitting from flower to flower was a flock of the cabbage butterfly *(Pieris rapae)*, a very common species, and hovering over a puddle formed by the recent rainstorm were several common sulphur butterflies *(Colias philodice)*.

The portrait of the spotted salamander *(Ambystoma maculatum,* seven inches long) was taken several years ago: I have not seen one recently in the Garden. This particular species of amphibean inhabits a large part of North America and the adults migrate considerably, so it is possible that a careful search of the Garden might reveal one. The spotted salamander is largely terrestrial and is found in moist woods, hiding under rocks and loose bark. It returns to water, usually a pond, to breed.

While the spotted salamander is the only kind I have seen in the Garden, other naturalists have informed me that other species have been found there.

Sawback turtle, *Graptemys speudogeo graphica.*

Spotted salamander, Ambystoma maculatum.

On a very hot summer morning while I was happily ensconced on a soft patch of grass and hoping that some animal would appear, whose picture I could take with little effort, my attention was drawn by a movement among the leaves on the ground nearby. Brushing them aside, I saw to my amazement a baby sawback turtle *(Graptemys speudogeo graphica)*. The illustration shows it greatly enlarged, because the length of its carapace was only about three inches long. This is not a native species, but is one of the kinds

Black-eyed Susan, *Rudbeckia hirta.*

Four-leaved loosestrife, *Lysimachia quadrifolia.*

Spotted knotweed, *Centaurea maculosa.*

often sold in pet shops. I suspect that someone who had tired of his pet, had deposited it in the Garden.

At this time of year most of the wild flowers are found in open fields and along roadsides. There is a succession of flowers almost daily and happily they will continue to appear, though in somewhat diminishing proportions, until witch-hazel *(Hamamelis virginiana)* breaks into bloom in November.

Only a few weeks ago there were relatively few plants in flower, and it required searching to locate them. Now they are much more abundant. As I strolled along the bank of the Bronx River, I came across a stand of four-leaved loosestrife *(Lysimachia quadrifolia)* at the edge of the woods. Though it is a common species, found in sandy soil in lowlands, often in moist ground, I am always pleased to see it. I admire its structure and enjoy watching the bees partake of its nectar.

With the passing of summer days all too quickly, I find the common daisy *(Chrysanthemum leucanthemum),* daisy fleabane *(Erigeron annuus),* devil's paintbrush *(Hieracium aurantiacum),* self-heal *(Prunella vulgaris),* cow vetch *(Vicia cracca),* and several species of clover *(Trifolium).* Members of the Parsley Family appear now and then, but its many species are not readily distinguished by the layman. I easily recognize sweet cicely *(Osmorhiza claytonii),* golden Alexander *(Zizia aurea)* and, of course, Queen Anne's lace *(Daucus carota),* sometimes called wild carrot or bird's nest. This very familiar wild flower of field and roadside possesses its own beauty. The finely cut leaves and flat-topped, dull white flower umbel, in the center of which there is often a tiny, deep purple flower, is indeed decorative.

The bright black-eyed Susan or coneflower *(Rudbeckia hirta)* dots the meadow with its deep golden-yellow ray flowers, while the somber common milkweed *(Asclepias syriaca)* rising three to five feet, attracts butterflies.

In the distance I note a group of plants which originally came from Europe but are now naturalized Americans, firmly established and widely distributed. Bouncing Bet or soapwort *(Saponaria officinalis),* a study plant, flourishes in waste places. Like so many of our wild flowers, bouncing Bet was brought to this country to grace gardens, but escaped and gives a touch of beauty to roadsides and fallow fields. As a very young lad I enjoyed squeezing the juice from the stems into water and stirring it to see just how much "soapsuds" would appear.

Beyond me is a plant which stands not on its own stems but climbs and clings to shrubs. Hedge bindweed *(Convolvulus sepium)* is to be seen over a wide area during July and August, wherever there are shrubs on which its twining stems may take hold. Its handsome funnel-shaped flowers, from white to faintly pink-tinged, may close before the middle of the day.

One of my favorites is the Asiatic dayflower *(Commelina communis),* a dainty plant with pretty blue flowers, originally from eastern Asia, as its name implies. It grows among deep grasses along the banks of the Bronx River and elsewhere in the Garden, and blooms from July well into October. The plant is best photographed in the morning, since its flowers expand at that time. The Asiatic dayflower is a member of the Spiderwort Family and related to tradescantias which are grown in gardens.

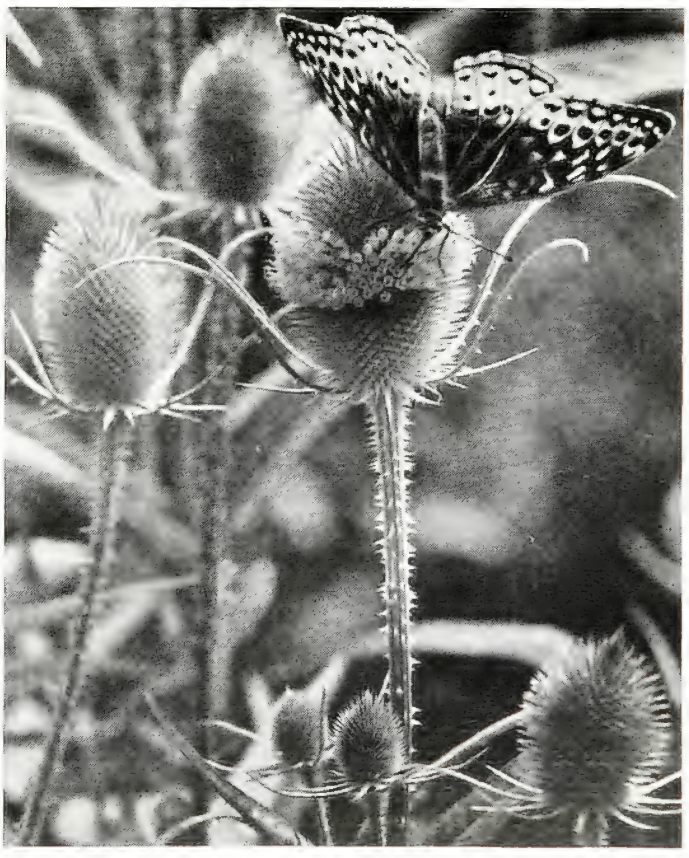
It is good to walk on this glorious summer day along the paths of this sylvan retreat. I walk alone, but I am not alone. The gentle noises denote life and activity and the urgency of living things—stately trees reaching skyward to bask in the sunlight; plants full of leaves and flowers, attracting bees and other insects to take of their nectar, to pollinate their kind; a garter snake quickly gliding beneath a log, destroying on its way a mound of sand surrounding the home of a colony of ants. But this does not matter since

Joe-Pye weed, *Eupatorium purpureum.*

Marsh-mallow, *Hibiscus moscheutos.*

Wild bergamot, *Monarda fistulosa.*

Butterfly (fritillary), *Speyeria cybele,* on common teasel, *Dipsacus sylvestris.*



Hedge bindweed, *Convolvulus sepium.*

the ants, known for their industry, will soon rebuild. The birds send melodies into the air while they engage in domestic affairs and forage for particles of food. The river, too, is a form of life, for as it flows on to meet the sea, it supplies nourishment to living creatures and carries the seeds of plants to resting places where they will start a new colony of their kind.

As I approach a different terrain, along the edge of a brook, I see among other wild flowers masses of Joe-Pye-weed *(Eupatorium purpureum),* forget-me-not *(Myosotis scorpioides)*, and lizards' tail *(Saururus cernuus).* Nearby is turtlehead *(Chelone glabra)*, arrowhead *(Sagittaria latifolia)*, and the brilliant cardinal-flower *(Lobelia cardinalis)*, a favorite dining place of the hummingbird. In the field beyond there is meadowsweet *(Spiraea latifolia)* and meadow-beauty *(Rhexia virginica).* In the wet meadow there is one plant which cannot possibly escape notice, for rose-mallow *(Hibiscus palustris)* is tall, to six feet, with stout shrub-like stems and pale pink or white flowers as much as six inches across.

In another section of the Garden I find star-thistle or spotted knapweed *(Centaurea maculosa)*, an interesting plant, about three to four feet high, with very narrow leaves and purplish pink flowers. At a distance it can easily be mistaken for thistle.

Elsewhere I find the wild bergamot or horse-mint *(Monarda fistulosa)* with pale lavender or white flowers. It is kin of Oswego tea *(M. didyma)*, a three- to four-foot plant, which has deep green leaves and bright red or magenta-purple flowers. This native is a familiar garden herb, sought after by bees and butterflies.

Insects are not generally popular, but despite the objectionable characteristics of many of them, it must be recognized that the number of known species of insects far exceeds the aggregate of all known animals, and that there is an important relationship between them and animals and plants. Some species of insects are valuable to mankind, because they destroy other insects, pollinate flowers, and are either the principal or the sole item in the diet of animals, some of which man uses as food. The naturalist, interested in nature as a whole, cannot ignore the existence of insects.

The casual observer of nature is not interested in the obscure, but in the obvious—therefore moths and butterflies have the greatest appeal. Among the species which have been seen in the Garden at one time or another are: American painted lady *(Vanessa virginiensis)*, red admiral *(Vanessa atalanta)*, pearly-eye *(Lethe portlandia)*, monarch *(Danaus plexippus)*, buck-eye *(Precis coenia)*, swallowtail *(Papilio glaucus)*, question mark *(Polygonia interrogationis)*, mourning cloak *(Nymphalis antiopa)*, cabbage *(Pieris rapae)*, common sulphur *(Colias philodice)*, and others including fritillaries, coppers, and skippers.

Previously I have mentioned that the adult mourning cloak butterfly, like other angle wings, hibernates and appears in early spring, heralding the approach of that season. The monarch butterfly informs us by its behavior that winter is not far off, for during late September and early October the monarch congregates in large numbers on a plant, tarries a while, and then starts on its southward migration.

(To be continued)

BAHAMIAN ONCIDIUMS (Continued from page 142)

with reddish brown; the lateral petals are of the same color but the tips are white. The lip is white with a yellow crest, and the dense spotting of reddish brown around the crest spreads both into the lateral lobes and the skirt of the lip. The column wings are white. The average size of the flower is about one-half inch.

This is a beautiful little oncidium and well worth the *little* space it would occupy in any collection. As happens with rare orchids, it does not seem to adjust readily when moved. Perhaps it is well to keep in mind the rather exacting conditions under which *O. lucayanum* grows and to try to duplicate them as nearly as possible. High humidity is surely a very important requirement. Here at The New York Botanical Garden I find that this orchid does best on a simple piece of cork hung in a position where it gets good light and can be syringed frequently. The roots do not like to be covered.

Bouncing Bet, *Saponaria officinalis*

COMING EVENTS

at

THE NEW YORK BOTANICAL GARDEN

(For more complete information about a particular event, write or phone LU 4-8500.)

Gordonia alatamaha

JULY-AUGUST BLOOMING

ANNUALS—cosmos 'Sensation'; calendula 'Flame Beauty'; *Salvia splendens* 'Salmon Pygmy', 'Fireball', and 'White'; cuphea 'Firefly'; zinnias, giant, 'Cherry Queen', 'Gold Medal', and 'Purple Prince'; marigolds 'Lemon Drop', 'Petite Yellow', 'Cracker Jack', 'Cupid', 'Man in the Moon', 'Dainty Marietta', 'Naughty Marietta', 'Petite Spry', and 'Tangerine'; *Zinnia pumila* 'Pinkie'; snapdragon 'Venus'; *Linaria* 'Northern Lights'; *Celosia plumosa*, dwarf form, and *C. argentea cristata* 'Fiery Feather'.

BULBS AND PERENNIALS—plumepoppy *(Macleaya cordata)*; *Meconopsis ritro*; *Physostegia virginiana* 'Vivid'; *Tunica saxifraga*; *Hemerocallis thunbergii*; *Lythrum salicaria*; fragrant plantain-lily *(Hosta plantaginea)*; *Inula royleana*; unicorn-plant *(Proboscidea jussieui)*; Japanese iris; summer phlox *(P. paniculata)*, horticultural forms; water-lilies *(Nymphaea)*, tropical and hardy varieties; American and Indian lotuses (*Nelumbium nelumbo* and *N. pentapetalum*); and water-shamrock or pepperwort *(Marsilea quadrifolia)*.

NATIVE PLANTS—butterfly-weed *(Asclepias tuberosa)*; black cohosh *(Cimicifuga racemosa)*; bee-balm *(Monarda didyma)*; Joe-Pye weed *(Eupatorium purpureum)*; goldenrod *(Solidago canadensis)*; star-wort *(Aster spectabilis)*; Stokes aster *(Stokesia laevis)*; and marsh-mallow *(Hibiscus moscheutos)*.

SHRUBS — summer lilac *(Buddleja davidii)*; *Abelia grandiflora*; *Clethra alnifolia*; *Hibiscus syriacus*; *Hydrangea arborescens grandiflora*; Japanese glory-bower *(Clerodendrum trichotomum)*; *Stewartia monadelpha*, *S. ovata*, and S. *pseudo-camellia)*; dwarf horse-chestnut or bottlebrush *(Aesculus parviflora)*, and franklinia *(Gordonia alatamaha)*.

TREES—silk-tree *(Albizzia julibrissin)*; golden rain-tree *(Koelreuteria paniculata)*; sourwood or sorrel-tree *(Oxydendrum arboreum)*; Japanese pagoda-tree *(Sophora japonica)*; bull bay *(Magnolia grandiflora)*, and *Magnolia obovata*.

EXHIBIT OF SIXTY-THREE CALIFORNIA WILD FLOWER PAINTINGS by Jane Seymour Pinheiro continues through the summer in the Museum Building.

EXHIBIT ON GOLDEN JUBILEE OF THE BRONX—dramatic photographs from The New York Botanical Garden's archives, contrasted with photographs of parallel present-day events, continues through the summer in the Museum Building.

NEWS, NOTES and COMMENTS

The annual meeting of the Corporation of The New York Botanical Garden was held at the Lorillard Snuff Mill on May 4, 1963. Charles B. Harding, President, conducted the business meeting at which Mrs. Willcox B. Adsit, Mrs. Etienne Boegner, Mrs. John N. Irwin 2nd, Mrs. Samuel W. Lambert, Mrs. Albert P. Loening, Mrs. Huntington McLane, Mrs. Ernest B. Tracy, Rev. Vincent T. O'Keefe, S. J., and Michael Rapuano were elected members of the Corporation; and Joseph R. Swan and W. Earl Andrews Honorary Members of the Board of Managers.

Sherman Baldwin, Henry F. duPont, William E. Hutton, Rev. Vincent T. O'Keefe, S. J., Mrs. Harold I. Pratt, Mrs. David C. Rockefeller, Dr. William C. Steere, Mrs. Arthur Hays Sulzberger were elected members of the Board of Managers, Class of 1967.

Distinguished Service Awards were presented to Dr. Edwin B. Matzke, Mrs. Harold I. Pratt, and Charles B. Harding. Mrs. Pratt is the only person to receive this award for the second time. Excerpts from the citations accompanying the awards follow:

Dr. Edwin B. Matzke has been associated with Columbia University throughout his career: first as an undergraduate, until 1924 when he received his A.B., from Columbia College; and later as an instructor (1928) who was promoted through the various academic grades to professor (1943). In 1958 he was appointed Chairman of the Department of Botany, to which position he was reappointed, with a citation that most aptly refers to his "devotion to and his untiring efforts toward the advancement of scholarship and instruction in botany at Columbia. . . ."

Edwin Matzke was born in the Bronx, in 1902, at a stone's throw from the Botanical Garden, where he still lives. As a thoughtful adolescent with an early reverence for life, attentive to liverworts and other small creatures, he developed much of his interest in plants here at The New York Botanical Garden. Soon he was to develop a long-enduring interest in the geometry of cells, in the morphogenesis of inflorescences, in the patchwork of autumn coloration. Designing all his studies with great rigor, and leading his collaborators and students in their research, he seems to have been possessed by a sense of pattern.

We may visualize this quiet American of 1928-1929, a traveling fellow at Kaiser Wilhelm Institute in Berlin, steeping himself in the heady atmosphere of the German academy and refreshing himself, as he has continued to do through the years, in the magnificent flowering alpine meadows of Europe. Edwin Matzke has looked younger than his age and has behaved with more wisdom than many of his contemporaries. His calm and serene personality does not hide his deep emotional commitment to botany. The image of their professor which his students will have taken with them is that of an exemplary figure.

It is no indiscretion to call to your attention, on this occasion, of the loves of Professor Matzke for alpine plants, Easter lilies, Joe-Pye weeds, and liverworts. In these days when too many of our fellow biologists close the windows upon nature, it is valuable to have among us an experimental morphologist who still gathers his cues from the natural environment and brings to the laboratory some of the mysteries which cannot be dissolved in the test-tube.

The values that are dear to him, which run like a golden thread through his career, are also dear to us at The New York Botanical Garden. As a member of our Board of Managers and of its Executive Committee, and as Chairman of the Botany Department of Columbia University, he has a privileged standing among us.

No tribute to Mrs. Harold I. Pratt would be complete without a reference to her keen interest in horticulture. Her estate at Glen Cove, Long Island, named "Welwyn," meaning "welcome," has been the mecca over the years for all horticulturists, and it is interesting to note that three salvias, developed at "Welwyn," were named in her honor. She was chosen chairman of the committee which installed "Gardens on Parade," the horticultural exhibit at the last World's Fair in 1939.

For all of Mrs. Pratt's long service, The New York Botanical Garden is extremely grateful, and it is with a sense of high regard and affection that this award is presented. For the first time in the Garden's history, a Distinguished Service Award is being presented to the same person for the second time.

For a period extending back well over four decades, Mrs. Harold I. Pratt has been friend,

Mr. Charles B. Harding, President of The New York Botanical Garden, presents the Distinguished Service Award to Mrs. Harold I. Pratt.

counselor, and benefactor of The New York Botanical Garden. Her interest in this institution has been unflagging, and all major projects of the Garden in recent years have had her generous help and support. Her activities on behalf of the Garden cover a wide field. During the years 1944-1950 she served as cochairman of a special committee which raised upwards of two million dollars for the postwar development of the Garden. Again it was due to her vision, zeal, and munificence that the reconstruction of the Snuff Mill during 1953-1954 was undertaken and the building remodeled into its present useful purpose as restaurant and garden meeting center. The construction of the Laboratory Building in the period 1954-1956 likewise was due in no small measure to the active assistance of Mrs. Pratt and latterly Mrs. Pratt has aided substantially in bringing to fruition the addition of a new library wing, now in the initial stages of construction and to be named in her honor, "The Harriet Barnes Pratt Library Wing."

Mrs. Pratt has served the Garden in other ways: she is an invaluable member of the Board of Managers and of its Executive Committee and served for many years as chairman of the City Relations Committee of the Board; she is a member of the Corporation and of the Advisory Council of which she was voted the distinction of being an Honorary Member. . . .

At this annual meeting of the Corporation, on May 4, 1964, Charles Barney Harding completes his fifteenth year as President of The New York Botanical Garden and begins his sixteenth year of distinguished service. He became a member of the Board of Managers in 1946 and was named Vice-President of the Garden the next year to succeed Henry de Forest Baldwin, who died May 18, 1947. At the annual meeting of the Corporation in May, 1949, Mr. Harding was elected President of the Garden, *vice* Joseph R. Swan. Under his strong leadership of the Board of Managers, much has been accomplished. The New York Botanical Garden has flowered, both literally and figuratively, as never before.

Among the major landmarks to be noted in Mr. Harding's course so far are the construction of the still relatively new Research Laboratory, the reconstruction and modernization of the Lorillard Snuff Mill, the first rehabilitation

Left to right, Dr. William C. Steere, Director of The New York Botanical Garden; David L. Eggers of Eggers and Higgins, architects; Newbold Morris, Commissioner of Parks of New York City; Mrs. Hermann G. Place, Vice-President of The New York Botanical Garden; Mr. Harding; and Mrs. Pratt, for whom the Harriet Barnes Pratt Library Wing is named.

of the Museum Building in more than a half century, and the pending construction of the new Harriet Barnes Pratt Library Wing, for which ground-breaking ceremonies will be held today.

An event of enormous importance to the Garden's employees, paid from funds provided by the City of New York, was the entry of the Garden in 1953 into the Social Security program with City participation. Of even greater importance to this same group of employees has been the adoption in 1962, finally, after many years of endeavor and negotiation, of a retirement system to which the City of New York contributes its share. Mr. Harding now serves as chairman of the Cultural Institutions Retirement System Committee.

In view of these outstanding and ever-accelerating achievements, our warmest desire, in all humility, is that Charles Barney Harding will continue to devote his wisdom, judgment, and energy to the best interests of the Garden just as he has done in the past.

Mr. Harding and Dr. William C. Steere, Director, presented brief reports. Their annual reports will be published later this year and distributed to the Garden's members.

Immediately after the annual meeting, the ground was broken for the new Harriet Barnes Pratt Library Wing. Participating in the ceremonies as speakers were Newbold Morris, Commissioner of Parks of the City of New York, Mr. Harding, Dr. Steere, and Mrs. Hermann G. Place, Vice President of the Garden. Mrs. Place's untiring efforts, as chairman of the fund-raising committee, are largely responsible for the many contributions from individual donors and foundations.

Rev. Vincent T. O'Keefe, S. J., President of Fordham University, pronounced the invocation.

Eternal and Almighty God

who has so wondrously blessed all creation with ineffable beauty and has supplied it with vast gifts and resources

Bless this work which begins today.

Bless those whose vision and generosity have made this possible.

Grant that this city and this nation may never lack a hunger in its citizens for knowledge, a yearning for deep maturing wisdom.

May the steps of this edifice be worn by the feet of generations seeking for truth.

Grant that from this hall may spread across our city and our land, knowledge of Your truth, respect for Your creation, and love of all Your creatures. Amen.

After Mrs. Harold I. Pratt had turned the first spadeful of earth, Mrs. Place presented her a silver trowel, suitably inscribed, as a memento of the occasion.

Activities of the Director and Staff. Dr. and Mrs. William C. Steere, at the invitation of the Academy of Science of Venezuela, visited Caracas the latter part of May. Dr. Steere delivered an address on "Distribution Patterns in Northern Plants" at the opening session of the Academy's Second Symposium.

Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Research, has been informed by the Hon. Secretary, Dr. V. Westhoff, that he was appointed a Corresponding Member of the Royal Netherlands Botanical Society, by action of the Society's General Assembly.

Dr. Maguire will retrace the area explored in Peru by the German botanist, August Weberhauer, at the turn of the century. He will be joined by Dr. Ramon Ferreyra, Director of the National Museum of Peru. They will study the *Guttiferae* and attempt to re-collect the specimens originally found by Weberhauer and destroyed during bombings of German herbaria in World War II. After the period of exploration, Dr. Maguire will tour major university and research centers in Peru, Chile, Paraguay, Bolivia, southern Brazil, and Argentina.

Dr. Ghillean Prance, Research Fellow under Dr. Maguire, will work with Dr. João Murça Pires, Head of the Department of Botany at the University of Brasília, on the second year of an inventory of the vegetation along the many new roads being developed in Brasília.

Dr. Howard Irwin, Associate Curator, will leave in late July to undertake the first of what is expected to be a long series of expeditions to the Planalto do Brasil. On the trip he will be joined by Dr. Thomas R. Soderstrom of the Smithsonian Institution and their activities will be focused on the western portion ("Triangulo Mineiro") of Minas Gerais and the Serra do Caiapó of southern Goiás. They expect to return the first of December. The work will be supported by the National Science Foundation.

Dr. Alma Barksdale attended the annual meeting of the American Society of Microbiologists held in Washington, D. C., May 3-7, 1964.

Dr. Richard M. Klein, Albert H. Caspary Curator, was on hand for consultation in biology at a recent "Career Conference," open to all students at City College.

Dr. Elsa O'Donnell, who has been Visiting Research Associate at the Garden since 1959, joined the Department of Anatomy at Cornell University Medical Center, in New York City, as a research associate the first of July.

Robert Jones, Senior Librarian, attended the meeting of the Bibliographical Society of Amer-

Above. Charles V. Johnson shooting *Borrichia* at Flamingo, Florida, in March, 1964, for the five-volume Wild Flower Series to be published by The New York Botanical Garden.

Right. Camp at Flamingo, Florida, where Dr. Harold William Rickett stayed while collecting material for the second volume of this series. Material for the first volume, to be published late in 1965, is going forward continually to the printers in England.

ica, held this spring at Yale University's new Beinecke Rare Book and Manuscript Library. Mr. Jones and members of the Library staff evacuated the back wing of the Library in preparation for its demolition prior to the construction of the new library wing.

Dr. P. P. Pirone answered questions for forty-five minutes on the Ed Joyce Show on C. B. S. Radio in May; addressed the Riverdale Garden Club on "Keeping Trees and Shrubs Healthy" and visited the gardens of four members to diagnose problems; addressed the Oyster Bay Garden Club on "Lawn Care," the Essex Fells Garden Club on "What's New in Gardening," and guests at the Arcadian Garden Center in Ossining on "Garden Pest Control."

Staff Seminar. At recent seminars, Dr. Tetsuo Koyama gave an illustrated talk on "A Summary of the Flora of the Japanese and Ryuku (Okinawa Archipelagoes including Formosa)" and Dr. Schoichi Kawano on "The Vegetation of Hokkaido, Japan." Walter Singer, Staff Photographer, showed the set of slides and tape-recorded comments prepared for presentation at the show of the photographic Society of America in the Coliseum this spring.

Advisory Volunteers. Announcement was made by Mrs. S. Bulkley Randolph and Mrs. Leighton H. Coleman at the annual meeting of the Corporations of The New York Botanical Garden that the Advisory Council and Volunteer Associates had merged into one organization to be known as the Advisory Volunteers and had elected the following officers: Chairman, Mrs. James C. Mackenzie; First Vice-Chairman, Mrs. S. Bulkley Randolph; Second Vice-Chairman, Mrs. Charles G. Proffitt; Recording Secretary, Mrs. Augustus G. Paine; Corresponding Secretary, Mrs. Willcox B. Adsit; and Treasurer, Mrs. Volney Righter.

The chairmen of committees are: Theater Benefit, Mrs. William H. Gregory; Children's Gardens, Mrs. John D. Beals, Jr.; Native Plant Garden, Mrs. Percy Douglas; Museum Exhibits, Mrs. Charles Burlingham; Perennial Borders, Mrs. Marcus Fair; Children's Educational Committee, Mrs. Henry S. Fenimore Cooper; and Membership Committee, Mrs. John E. Lockwood, Mrs. Herman G. Place, and Mrs. Leighton H. Coleman.

Municipal Cooperative Education Program. The trainees taking part in the project between The New York Botanical Garden and Christopher Columbus High School, under the Municipal Cooperative Educational Program, took a trip to Julius Roehrs Company in Rutherford, New Jersey. The following paragraphs have been taken from reports by several of the trainees.

"Our trip to the nursery started at 9:30 a.m. at which time the bus arrived at Christopher Columbus High School to take us to . . . . Julius Roehrs in Rutherford, New Jersey. We left for the Botanical Garden to pick up the other boys who were working that week, and several officials from there . . .

"As we walked through the greenhouses we entered a small room where . . Alfred B. Graf, the manager, talked to us for quite a while about the greenhouses and the production difficulties.

"There are one hundred and forty greenhouses on twenty-six acres of land, some of which are at least one hundred years old. The company is the biggest commercial distributor of rare plants in the whole world, and employs upwards of one hundred and fifty men and women.

"After lunch we split into groups and were taken . . into the potting areas, hothouses, cactus houses, and spore houses, in which some very delicate plant work is done. We walked into a house in which there is special lighting to speed up the growing and flowering of plants, just like having a long day and a short night."

" . I was in the group led by Mr. Singer, the photographer to the Botanical Garden. One interesting thing I particularly noticed was the way they water plants. A long pipe runs over the plants which has small rubber tubes leading into each pot. In this way each plant can be watered separately. [Roehrs] also has a light system in which the light flashes on in the middle of the night, fooling the plant into thinking there are long days and short nights and causing it to bloom before its natural time.

"This trip was the greatest. I sure hope we'll be able to take more."

"Founded in 1869, Julius Roehrs supplies most of the plants for New Jersey and the Metropolitan area. The plants in banks, restaurants, and other places of business were probably supplied by Roehrs, as they have one of the largest collections of foliage plants and unusual flowers in the world.

" . . . they use a thousand gallons of (fuel) oil a day in cold weather to heat the greenhouses. They have developed a way of forcing or preventing the growth of mums, which are now considered an all year-round flower, not only seen at Thanksgiving time. During the night lights, which automatically turn on for one minute out of every fifteen, are placed over the plants.

"I learned much about how a commercial nursery is operated. My visit also helped me to understand the care a plant must have to survive. I hope I'll visit many more nurseries."

"We visited the boiler room, an enormous place which burns about one thousand gallons of oil a day in winter. There is also a coal burner to use in emergency, if the oil burner should fail.

"To give an idea of how much business they do, they grow from five hundred thousand to one million azaleas a year. They also grow about one thousand poinsettias from which they get seven cuts per plant. Around Easter they are very busy. They usually load five trucks a day, but at Easter they may load as many as thirty."

Congress Day at the Garden. A full and varied program has been arranged at The New York Botanical Garden for October 2, 1964, when attendants of the American Horticultural Congress will visit the Garden. Staff members will be stationed around the grounds (the Conservatory, Propagating Range, Montgomery Conifers, etc.) and in the Library, Herbarium,

and Research Library, at specified hours in the morning and afternoon, to receive the visitors and to answer their questions.

Dr. William C. Steere, Director, will welcome the group in the Auditorium at eleven o'clock. He will be followed by T. H. Everett, Assistant Director (Horticulture) and Senior Curator of Education, on "The Educational Program at the Garden," and by Dr. P. P. Pirone on "The Garden and the Public." In the afternoon, Dr. Arthur Cronquist, Curator, will discuss "Horticultural Importance of Taxonomy," Dr. Annette Hervey, Senior Research Associate, "Laboratory Research at the Garden," and Dr. Steere will conclude the session with "A Summary."

Visitors to the Garden

Dr. Angel L. Cabrera, Universidad Nacional de La Plata, Facultad de Ciencias Naturales y Museo, La Plata, Argentina.

T. D. Pennington, Forest Herbarium, Oxford, England.

Richard M. Lewis, Cornell Plantations, Cornell University, Ithaca, N. Y.

Dr. A. J. Sharp, Gwynn W. Ramsey, Wayne Chester, John S. Drumke, University of Tennessee, Knoxville, Tenn.

Edward T. Browne, Jr., University of Kentucky, Lexington, Ky.

Dr. Carl L. Withner, Brooklyn College, Brooklyn, N. Y.

Frank S. Crosswhite, Keith E. Roe, University of Wisconsin, Madison.

Juoko Merilainen, University of Helsinki, Finland (presently at University of Wisconsin, Madison).

Dr. Theodore Mosquin, Plant Research Institute, Ottawa, Canada.

Dr. Conrad V. Morton, Smithsonian Institution, U. S. National Museum, Washington, D.C.

Drs. Alan Graham, Shirley Graham, John R. Raper, Harvard University, Cambridge, Mass.

Dr. Richard A. Howard, Director, Arnold Arboretum, Harvard University, Cambridge, Mass.

Dr. Rita McMahon, Dr. Eleanor Witkus, Fordham University, New York.

Dr. P. Maheshwari, Delhi University, Delhi, India.

Dr. John Mirky, American University, Beirut, Lebanon.

Louise Fisher, Dean of Women and instructor in the identification of woody plants, Ambler Campus of Temple University.

In spite of a heavy rainfall, five hundred and fifty members of The New York Botanical Garden attended Members' Day at Brookside, the estate of Mr. and Mrs. Roger Glenn Mook at Rye, New York, on April 29, 1964. Upper. Some of the members, equipped with raincoats and umbrellas, admire the narcissi, thousands of which grace Brookside. Lower. Mrs. Mook graciously welcomes late arrivals for the luncheon served in a marquee adjacent to her beautiful home.

Dr. Herman F. Becker and Dr. Chester A. Arnold, of the Department of Botany, The University of Michigan, left at the close of the University's academic year on a "fossil angiosperm hunt" in Wyoming and southwestern Colorado. Dr. Becker visited The New York Botanical Garden before returning to Ann Arbor for the summer session. He will rejoin the Garden's staff as Research Associate in September to continue his study, under a National Science Foundation Grant, of the Garden's fossil collection.

David Burpee, "dean of American seedsmen," received the Gold Seal of the National Council of State Garden Clubs, Inc., for his stature as a "world gardener" and his contribution to the "Seeds for Peace" program. The presentation was made by the Council's President, Mrs. J. Gordon Gose, of Seattle, Washington, at the awards banquet in the Waldorf Astoria Hotel, New York City, during the thirty-fifth annual national convention of the Council, attended by more than two thousand delegates and guests.

The Gold Seal, the highest award of this organization of four hundred and fifty thousand amateur gardeners, is given "to an individual, organization, or institution which has made a contribution in the field of gardening or horticulture of national or worldwide significance."

Edwin A. Menninger of Stuart, Florida, an authority on flowering trees of the tropics, received an honorary degree of Doctor of Science from Florida State University. He is author of several books, *Flowering Trees of the World for the Tropics and Warm Countries*, *Seaside Plants of the World*, and *Fantastic Trees* (in press) and of numerous articles.

In 1958 he was awarded the Thomas Barbour Medal of Fairchild Tropical Gardens and the Sesquicentennial Bronze Medal of the Botanical Garden of Rio de Janeiro, and in 1957 a citation from the American Horticultural Society.

South American Garden Tour. Gardens and native plants will be emphasized during a tour of six South American countries. Tour conductor Phil Clark, Assistant to the Director (Public Relations) of The New York Botanical Garden, lived in Mexico for twelve years and wrote about plants and gardening there.

Stops on the tour, which leaves from New York and Miami on October 12—the South American spring—and returns November 14, are: Panama; Quito, Ecuador; Lima, Cuzco, Machu Pichu, and Pisac, Peru; Santiago and Vina del Mar, Chile; Bariloche and the Chilean-Argentine lake country; Buenos Aires, Argentina; and Rio de Janiero, Brazil.

All major stops include visits to public and private gardens as well as the regular tourists' attractions. A highlight will be the home and garden of famed Brasília landscaper and architect Roberto Burle Marx. The garden includes "push-button weather," by which climate is

altered through mechanical controls.

The tour is arranged by the Jean Berke Travel Service, 518 Fifth Ave., New York, long-time specialists in garden travel, and Panagra. Cost will be $1,844 from New York and $1,762 from the Miami gateway.

The Administration and Research Building of the United States National Arboretum was dedicated by Secretary of Agriculture Orville L. Freeman on April 27, 1964, in the presence of several hundred representatives of botanical gardens and arboretums, horticultural and plant societies, garden clubs, scientific leaders, and Members of Congress. Mr. Freeman dedicated the building to:—

"the scientists here who will use it as a laboratory for study and experimentation;

"the scientists in other botanic gardens and experiment stations who will benefit from the exchange of plant material and plant knowledge;

"the scientists and students who will come from various parts of the world to use the valuable reference material assembled here;

"the nurserymen, the park directors, the municipal planners, the road and highway superintendents, the foresters, and the landscape architects who will adapt the developments here to their uses;

"the garden club and horticultural society members who have supported the Arboretum in the past and will take pride in it in the future;

"the visitors who will come here . . . the adults and school children . . not only from Washington but from all the fifty States and from other countries . . . who will find the Arboretum an outdoor counterpart of the Smithsonian . a living museum . . a place of striking beauty and serenity;

"and finally, we dedicate this building to those who, not having the opportunity to visit the National Arboretum, will yet find great pleasure in growing and caring for the new and better trees and shrubs that will be developed here."

Other speakers were Hon. Carl Hayden, United States Senator from Arizona, and Hon. Clarence Cannon, United States Representative from Missouri, (since deceased) both of whom had long been good friends of the National Arboretum and had given it their wholehearted support. Dr. Nyle C. Brady, Director of Science and Education, United States Department of Agriculture, was master of the ceremonies which were held on the terrace of the auditorium wing, adjacent to the reflecting pool.

The dramatic contemporary-style structure of textured gray-white concrete, glass, and aluminum, provides some twenty-seven thousand feet of space for offices and laboratories for the Director and the research staff, an auditorium-exhibit hall, an herbarium with a capacity for over a million and a half specimens, a small library and reading room. The glass-walled lobby and information center have areas for educational exhibits and displays of living plants.

Before the dedication, guests were taken on a bus tour of the National Arboretum to see the azaleas—there are some seventy thousand plants in more than one thousand species and varieties—and the collection of conifers, recently presented by William T. Gotelli of South Orange, New Jersey. Secretary Freeman presented a framed citation of appreciation to Mr. Gotelli at the close of the dedication exercises.

W. Q. Moir, on behalf of the Hawaiian Botanical Gardens Foundation, presented red leis to Secretary Freeman and Henry T. Skinner, Director of the United States National Arboretum, in recognition of the facility's interest in the proposed Hawaiian botanical garden.

"Flowers by Prescription" were among the exhibits at the Food and Home Fair, held on the patio of the Administration Building of the United States Department of Agriculture, Washington, D. C., April 14-30, 1964. "Prescription" flowers are ornamentals whose development can be controlled by the use of techniques developed recently through scientific research. Dr. Henry M. Cathey, Horticulturist with the Department's Agricultural Research Service, demonstrated at the Fair how petunia seeds can be encouraged to germinate more readily by exposing them to extra incandescent light during each twenty-four-hour period. A germination rate of ninety percent is possible under such conditions.

These advances in floral management have been made because of new knowledge of the light requirements of plants, of the part played by a plant pigment called phytochrome in regulating the habits of plants, and the careful application of plant growth control chemicals.

Other garden annuals which respond to extra light include bachelor's button, China aster, snapdragon, phlox, and verbena. Dr. Cathey suggests growing these flowers on an eight-hour light formula as young plants to delay flowering and promote vegetative growth, and then setting them out in beds to flower profusely all summer under the stimulus of long summer days.

The American marigold is managed in a different way, because it is a short-day plant. Eight hours of strong light will promote early flowering in the marigold and exposure to twelve hours of light daily will delay flowering and encourage vegetative growth. Other short-day annuals which can be managed like marigold are scarlet sage, cockscomb, and coleus.

Flowering responses take place because of the

(Continued on inside back cover)

The Committee of the Native Plant Garden of The New York Botanical Garden and Mrs. John W. Donaldson, a member of the Committee, entertained contributors to the Native Plant Garden Fund at Mrs. Donaldson's home, Deep Hollow Farm, Millbrook, New York, on May 6, 1964.

Upper Right. Mrs. Donaldson and Dr. Samuel W. Lambert, Jr., discuss some of the native plants in Mrs. Donaldson's garden.

Lower Right. Mrs. Percy L. Douglas (right), Chairman of the Committee of the Native Plant Garden, and Mrs. Donald B. Straus, a member of its Steering Committee, examine some of the native plants at Deep Hollow Farm.

Below. T. H. Everett, Assistant Director (Horticulture) and Mrs. Donaldson examine a native plant, with Dorothy Ebel Hansell, Editor of *The Garden Journal*, an interested onlooker.

BOOK REVIEWS

THE LAST 10,000 YEARS. Martin, Paul S. 87 pages, illustrated, indexed. The University of Arizona Press, Tucson, Arizona. 1963. $3.75.

Out of the "dust" of the earth a new science is born, a new recognition of ancient events and phenomena, even a reevaluation and reinterpretation of our immediate ancestors on this continent. Palynology, the study of spores and pollen, has long served the historical deciphering of earth profiles in the form of bluffs or drill cores from dry lake beds and bogs or other suitable areas where a floral sequence of events is suspected. Palynological papers, reports, and books exist in numbers like pollen in an anther, but the author has gleaned a refreshing new dimension from Arizona's desert range and pine lands. He not only uses the results of his thorough studies to recreate the southwestern landscape of the past five thousand to ten thousand years as a function of floristic composition and ecology, but also highlights archaeological levels of the Sulphur Springs people of six thousand years ago, who lived in a more humid climate than that of today. Of necessity the discussion is restricted to southwestern desert and semidesert eco-regions which possess relatively undisturbed "climatic climax" plant communities. A more accurate historical sequence is therefore presented than would be possible from regions where more diversified temperate floras under greater precipitation existed.

Martin's work, although regionally circumscribed, can easily serve as a stimulating and very readable introduction to anyone interested in paleoecology. The book lacks the usual dryness of such topics and may therefore attract the novice as well as the expert. A great asset is its glossary, though restricted to desert ecological terms. An extensive list of scientific and common names of plants and animals mentioned in the text provides an overall survey of the historical and living flora. The extensive bibliography of 186 references offers the reader an excellent cross section of palynological and ecological literature for western North America and Mexico.

HERMAN F. BECKER

THE ORIGIN OF ADAPTATIONS. Grant, Verne. 606 pages, illustrated, indexed. Columbia University Press, New York. 1963. $12.50.

Would you like to know the current status of evolutionary theory? Are you a little weak on terminology, but willing to spend some time if things are clearly explained? Then this book is for you. Or are you a graduate student in any field of biology? This book is for you, too. Dr. Grant's contribution is to organize and explain what is known or believed, in such a way that you do not have to be a specialist to follow him.

I personally believe that current evolutionary theory leans too heavily on natural selection and not enough on the nature of the supply of mutations which become available for selection to act on; but Dr. Grant's presentation is certainly in accord with the writings of those who dominate evolutionary thought today. It is a good book, which admirably serves its purpose. You will not read it all in one sitting, or even in two or three; but if the subject itself holds any interest for you, you will find it well worth your time.

ARTHUR CRONQUIST

PLANT SUCCESSION AND INDICATORS. Clements, Frederick E. 453 pages, illustrated, bibliography. Hafner Publishing Co., Inc., New York and London. 1963. $10.00.

Few scientific monographs have such quality and interest that they are reprinted every generation, but such is the case with Clements' *Plant Succession and Indicators*. The two long papers were first published as separate Carnegie Institution of Washington Publications, *Plant Succession* in 1916 and *Plant Indicators* in 1920. A book combining the two was published by H. W. Wilson Co. in 1928, and this book is now reprinted by Hafner Publishing Co.

Frederick E. Clements was the greatest of American ecologists, and also the most widely criticized. A brilliant theorist, he took the formative ideas of a young science and fashioned them into a system of interpretation. The fact that much of his system has not stood up under later study does not reduce the greatness of his achievement in creating it, and thereby playing one of the major roles in founding a science. The strength and weakness of his work are conjoined, for Clements was a system-builder who thought his way, boldly and productively, well beyond the range of real scientific understanding of his time, accepted as guidelines analogies between the individual organism and the plant community which are now in disfavor, made assumptions no longer found reasonable, and coined an abundance of words to be found in this book which are no longer in use. But the ideas of his system were of major importance, he was gifted as a writer, and his work is still valuable for its scholarly treatment of the literature. These monographs have the quality of classics.

Hafner's reprint will be appreciated by the many ecologists who will buy and study it, as every student in the field should. The non-ecologist should appreciate that it is both well worth reading for its many insights into relations of plants and environment, and a work which diverges widely from some aspects of current ecological understanding.

R. H. WHITTAKER
Biology Department
Brooklyn College
Brooklyn, N. Y.

DICTIONARY OF ECOLOGY. Hanson, Herbert C. Philosophical Library, New York. viii + 382 pp. 1962.

The late Herbert C. Hanson, who compiled the *Dictionary of Ecology*, was a renowned ecologist and respected teacher in the United States. His aim in this book was "not to define words . . . but rather to give clear, concise statements indicating present-day usage." I think he also was trying to provide definitions broad enough to be applicable in several disciplines, not only in the narrower sense of plant or animal ecology. The format and typography of the book are good, and words are easily located; the numerous cross-references usually (but not always) follow-through as intended.

It is too bad that the author cannot defend his choice of definitions. In his effort to be concise he has sacrificed clarity; many of the definitions are inadequate, not a little confusing, and, in the "related fields," almost erroneous. I won't attempt to list all the examples, but will cite two. MYCORRHIZA: "the symbiotic relationship of a fungus with the roots of certain plants . . ." KARST: "refers to a limestone region with a dry, barren surface . . ." (as in Kentucky?)

In spite of the shortcomings of this book, it will probably be a useful reference and may help diminish the multiplicity of definitions in ecology. It is regrettable that the author did not help the neophyte by including a guide to pronunciation; along with proliferating terminology is also the problem of trying to stabilize the pronunciation of scientific words. If a word is of Greek origin, it seems to me that it should bear some semblance to Greek pronunciation; a French word should sound French, etc. It is to be hoped that someone will revise this *Dictionary of Ecology*, or compile a new one, and will incorporate a guide to pronunciation.

VIRGINIA A. WEADOCK

AN EASY GUIDE TO ARTIFICIAL LIGHT-GARDENING FOR PLEASURE AND PROFIT. Johnson, Vernon and Winifred Carriere. 1922 pages, illustrated. Hearthside Press, N. Y. 1964. $4.50.

As evidenced by the numerous calls and letters to staff members of The New York Botanical Garden, there is a growing interest among amateur plant growers for precise information on the conditions necessary for the successful cultivation of plants under artificial light. Types of light sources, the engineering details of the lights, humidity, nutrition, propagation, and some idea of plants which can be grown under lights are very real and important problems.

The authors of this volume have evidently been growing plants under lights for many years and seem to have written their book to assist others to hurdle the problems which they must have faced. How I wish that they had succeeded! It is true that they have given a great deal of information on many of the important problems but the city dweller, with little acquaintance with horticulture, would be baffled and even unhappy with this volume. It just isn't complete.

The first two chapters on the physiological basis for artificial lighting and on the physical set-up are inadequate and contain a number of important errors of fact. Amateur (and even some professional) horticulturists should really take some botany or clear their writings with a scientist. Thus, dust on leaves does not deprive plants of humidity; cell growth is not restricted to the dark period; sunlight does not wake up the plant; and plants cannot refuse to flower. More important than fault-finding with such details, the chapters simply do not permit the all-thumbs non-horticulturist to design or construct a light bank or a light source which will facilitate the artificial cultivation of plants. The reader is told about fluorescent lamps, incandescent lamps, input wattage of lamps, and infrared light (where they mean far red light) but are not told about illumination intensities, distance from source to plants, heat load, radiation balance, and many other factors which make the difference between success and failure.

The rest of the book is a rather standard recital of the "how-to" concept of proper horticultural practice with house plants which can be found in almost any book at half the price. It does close with a very useful but in-

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adequate summary of plants for high and low light. RICHARD M. KLEIN

ANTIBIOTIC-PRODUCING MICROSCOPIC FUNGI. Bilai, V. I., 215 pages, subject index, charts. American Elsevier Publishing Co., New York City. 1963. $11.00.

This book has been translated from Russian into English. The date of publication in Russia is not given, but papers published in 1960 are the most recent cited. The antibiotic-producing species of the genera *Penicillium*, *Aspergillus*, *Cephalosporium*, *Trichoderma*, *Trichothecium*, *Alternaria*, and *Fusarium* are described and illustrated. The chemical and biological properties of the antibiotics produced by these species are given, along with brief descriptions of methods for producing and purifying the antibiotics concerned. ALMA W. BARKSDALE

COASTAL PIONEER PLANTS AND HABITAT IN THE TAMPICO REGION, MEXICO. Poggie, Jr., John J. 62 pages, illustrated. Louisiana State University Press, Baton Rouge, La. $3.00 paperback.

For the seriously interested—either in the plants or ecology of beach areas in eastern Mexico, this book will be helpful. It examines in careful detail the plants and all factors influencing the 130-kilometer, offshore segment of sandy beach between Tampico and Tuxpan, known as Cabo Rojo. It is useful both as a case study of a specific and of a representative area. The author's conclusion that "the ability of vegetation (in the Cabo Rojo) to modify habitat is secondary to the ability of habitat to control vegetation" puts in the precise language of science the hostility to plants of this habitat, with its fierce northers, its salty, calcareous, mainly large-grained sand, and its exposure to the elements in general. He found the small number of plants (thirty-nine species), sturdy enough to "pioneer" such an area, mostly had thick leaves and stem cuticles and epidermises and sunken stomata (loaf openings). Prostrate plants grow nearest the sea and low, erect shrubby plants farther inland. Grasses, sea-grape, morning-glories, *Croton punctatus*, and *Bidens pilosa* were among the especially common species.

PHIL CLARK

GARDENING WITHOUT POISONS. Hunter, Beatrice Trum. 314 pages, indexed. Houghton Mifflin Co., Boston. 1964. $5.00.

Neither the prejudices of "nature" cultism nor of commercially vested interests have dulled Mrs. Hunter's scientific awareness of the very real dangers and very real values of chemical pesticides. Accepting that they perform an important function, she emphasizes that they are but one weapon among many in the arsenal of man's unending war with his insect enemies. Among others already effective in some situations, and which should be further investigated, are the use of man's insect friends, birds and other animals, botanical attractants and repellants, traps, plant culture and breeding for resistance, insect disease and insect breeding for genetical suicide. She describes how some of these can be put into practical use by the home gardener and suggests avenues of research which might broaden their effectiveness.

"An approach," she writes, "to insect control which is favored by workers in applied ecology is 'integrated control.' This combines biological and chemical controls in such manner as to exploit the desirable features of both, while minimizing their limitations. In an ideally integrated program pests are first attacked by a combination of biological agents. After all possibilities have been exhausted, limited use is made of chemical control timed to inflict the least amount of damage to beneficial organisms, soil and plant life. We must learn to make use of chemical measures, remarked Roland Clement, 'as a surgeon's tool instead of as a bludgeon.' "

After the recent reports of endrin poisoning of fish in the Mississippi, these thoughts take on new urgency.

PHIL CLARK

BONSAI-SAIKEI, THE JAPANESE MINIATURE TREES, GARDENS AND LANDSCAPES. Kawamoto, Toshio and Joseph Y. Kurihara. 361 pages, illustrated (part color), indexed. Nippon Saikei Co., Tokyo, Japan. 1963. $30.00.

Bonsai has become a popular word in this country, but the technical and artistic meaning is not well known. Of late several books have been published on the subject, each attempting with varying grades of success to reveal the secrets of this type of horticulture. For some time we have needed more authoritative works in English by Japanese authors; the most significant texts are in Japanese. Until now the only one available in English was written by Yoshirmura and Halford in 1957, so the present volume is a welcome addition.

Bonsai-Saikei has a handsome binding and many black and white illustrations, interspersed with a variety of attractive color plates. The book is well written and readable. In general, the technical information conforms to the

(Continued on page 164)

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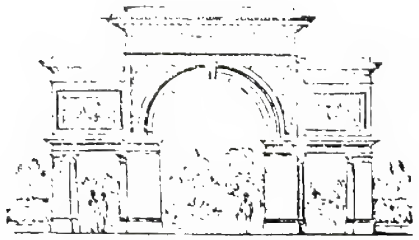

MAIN ENTRANCE TO THE PROPOSED BOTANIC GARDEN.
BRUNNER & TRYON, ARCHITECTS

Botanic Garden Committee of the Torrey Botanical Club.

Mr. E. E. Sterns,
Chairman.
Mr. Arthur Hollick,
Secretary.
Mr. Thomas Hogg.

Dr. H. H. Rusby.
Dr. T. F. Allen.
Prof. N. L. Britton.
Prof. J. S. Newberry.
Hon. Addison Brown.

All communications should be addressed to the Chairman, 23 Union Square (Room 12), N. Y. City.

New York, February 21, 1889.

Dear Sir:--Your co-operation is earnestly solicited in the formation of plans for carrying out the scheme, devised and put into practical working shape by the Torrey Botanical Club, for the establishment in Bronx Park of a public Botanic Garden of the highest class.

This Garden project has been received with the greatest favor by the city press; the Park Commissioners are thoroughly in sympathy with it and ready to furnish an admirable site; and if a construction fund of a MILLION DOLLARS can be raised it will ensure the immediate establishment of a great scientific and yet popular institution, in the highest degree interesting and instructive to the entire public.

The time is peculiarly auspicious for a concerted and successful effort to give this metropolis a Botanic Garden that shall compare favorably with the one at Kew, of which London is so justly proud. If the movement enlists your sympathy the Torrey Club Committee will be most happy to receive suggestions from you, or to send, by appointment, a representative to confer with you as to the wisest course to be pursued.

Trusting you may share our belief that this enterprise deserves the prompt and generous support of every public-spirited citizen, I am,

Most sincerely yours,

Chairman of the Botanic Garden Committee of the Torrey Botanical Club.

P. S.--Illustrated articles of special interest, relating to the proposed Garden, appeared in The Commercial Advertiser of Feb. 9, and in The Sunday Sun of Feb. 10. Copies of these, upon receipt of postal card application addressed to the Chairman, will be promptly sent to those desirous of investigating the matter farther.

The Torrey Botanical Club is sure of many and hearty good wishes in its endeavor to establish a public botanical garden in Bronx Park. We hope to see numerous and generous responses to the Club's invitation for subscriptions. The proposed garden will be an educational force of great value.—*The Tribune, Feb.* 11.

For the equipment and maintenance of the garden we must depend upon the munificence of rich men, and in no other way could a rich man be surer of promoting the public pleasure and instruction.—*The Times, Jan.* 16.

It is a great project, and it would be a great thing if it could be adequately realized.—*The Sun, Jan.* 15.

"A million of dollars is a great deal of money, it is true, but New York is a very rich city, and New York is a very public-spirited city."—*The Commercial Advertiser, Feb.* 9.

The million is the unit, and somehow enterprising folks seem to get there in a surprising number of cases. We trust, then, that success will attend the plucky endeavor of the Torrey Botanical Club.—*The Evening Sun, Feb.* 8.

I am heartily in sympathy with the movement. Such a garden is indispensable for education and for recreation.—*Ex-Mayor Hewitt, Feb.* 14.

BROMELIADS IN CULTIVATION. VOL. 1. Wilson, Robert Gardner and Catherine. 126 pages, illustrated, indexed. Hurricane House Publishers, Inc., Florida. 1963. $6.50.

Bromeliads in Cultivation is a practical presentation of bromeliads in text and illustration for the bromeliad amateur and for the advanced bromeliad fan who is searching for classification in down-to-earth language without becoming involved in technical, botanical terminology. This down-to-earth knowledge with the Wilsons comes naturally, because they have practiced in Florida for many years what they so wisely teach and preach in this fine book. The book is the first of its kind written in English. The Wilsons tell us the accuracy of the names was checked by Dr. Lyman B. Smith, a fact which in itself is a great asset to this book.

The second volume is needed to finish the enumeration and description of bromeliads in cultivation.

WALTER SINGER

PHOTOGRAPHING NATURE. Linton, David. 262 pages, illustrated, indexed. American Museum Science Books. Doubleday & Co., New York. 1964. Paperback, $1.95.

Photographing Nature is a good handbook by a well-known professional. His knowledge in this field is backed up by considerable experience and is well presented. The fourteen chapters cover not only specialized subject matter, but the fundamentals of photography as well. The beginner, for whom this handbook is written, will profit from the practical and valuable information. The old saying, "One picture is worth ten thousand words" could have been followed to better advantage in illustrating the well-written text.

WALTER SINGER

The New York Botanical Garden, founded in 1891, took note of the Borough of the Bronx, New York, on its Golden Jubilee, 1914-1964, with an exhibit of then and now photographs of the Garden in the Museum Building.

Above. A group enjoys a nature stroll on October 29, 1895.

Right. A nature study class today.

Right. The Museum and Administration Building today; and below, the same building in 1900.

(Continued from page 161)

methods taught in this country.

Of particular value is the emphasis on delineating and illustrating the front and back aspects of a bonsai, since this is frequently a problem for western students. Beginners may have difficulty in controlling and shaping a tree and should find the diagrams on trimming over a four-year period very instructive.

One missing detail is wiring the plant into its container. In all fairness, the reviewer admits that not all the texts mention this, but he has found it an extremely useful technique for keeping the plant in its appointed place as well as securing it against mishap. Mr. Yoshimura's treatment of the matter is recommended.

There is one point of continuing confusion. The authors introduce a new term to the western reader, "saikei." In the introduction Messrs. Kawamoto and Kurihara describe the art historically and give a detailed definition of bonsai; however, they do not explain what the term saikei means. Not until page 352 do the authors point out how to differentiate between the two forms. "Bonsai is a single tree in a pot, generally old, refined and elegant, whereas saikei is a group of one, two or many trees planted in a container enhanced with stones. Trees are generally young, vigorous and healthy." This definition is confusing to this student of bonsai and probably to others, particularly since elsewhere the authors state that ten-year old group plantings are "promoted" to bonsai. We have been taught that all trees and miniature landscapes are bonsai or at best "grown in the bonsai style." The authors should note that even when trees are old, they must produce vigorous and healthy shoots each year to prosper. Along the same line, Chapter 10, "Saikei to Bonsai," does not establish the existence of a transitional period as the title and illustrations suggest. Clarification would certainly have been desirable.

The volume is a valuable contribution to the art, particularly for its many excellent photographs and illustrations, which will spur the reader on to create and refine his bonsai. It is expensive, perhaps prohibitively, for beginners; however, for the devotee, it is a mandatory addition to his collection.

JERALD STOWELL, *President*
The Bonsai Society
of Greater New York,
Armonk, New York

Above. An adult gardening class at The New York Botanical Garden in 1917.

Right. The children's garden today.

INTRODUCTION TO THE WORLD OF ORCHIDS. Dunsterville, G. C. K. 102 pages, illustrated (part color). Doubleday & Co., Inc., Garden City, New York. 1964. $11.75.

If the reader of this review is an amateur or professional orchid grower, he will most certainly want to have this book. There are forty-four spectacular, full-color photographs of Venezuelan orchid species. The author, residing in Venezuela, is able to observe them in their natural habitats. The talented Mr. Dunsterville has produced a superb single-volume publication which contains a wealth of information, pertinent facts on the plants and their locations. In some cases, he gives hints on their culture.

JOHN BORIN

CACTI AND OTHER SUCCULENTS. Ginns, R. 191 pages, illustrated, indexed. Penguin Books Inc., Baltimore, Md. 1964. Paperback, $2.45.

Flabby writing is all-too-often a weakness of American books on gardening, particularly when aimed at the amateur. This is not true of this little paperback by R. Ginns, a leading English cacti specialists, who did his work in collaboration with the authoritative Royal Horticultural Society. Culture is presented in a practical, easy-to-understand way. Hundreds of species are described; one hundred and twenty-five are illustrated in detail—sharp black and white photographs. Choice of succulents is limited to those "reasonably easy to obtain, relatively easy to grow and which form good-looking specimens in pots of not more than five inches."

PHIL CLARK

PRUNING GUIDE FOR TREES, SHRUBS, AND VINES. Stevenson, Tom. 144 pages, illustrated, indexed, list of words used by tree experts. Robert B. Luce, Inc., Washington, D. C., 1964. $3.95.

This elementary guide has grown out of Mr. Stevenson's writings on gardening for the Baltimore *News Post* and *Sunday American* and the Washington *Post*. A general description of the reasons for pruning and its effects introduces the instructions for specific types of plant material. Line drawings, in most cases from the publications of agricultural experiment stations, clearly demonstrate individual points. Although the book is serviceable, it is of no great importance as an addition to the literature on pruning.

HARVEY A. SIMMONDS

GREAT MEN OF MODERN AGRICULTURE. Cannon, Grant G. 256 pages, illustrations, index, bibliography, glossary of agricultural terms. The Macmillan Company, New York, 1963. $4.95.

Mr. Cannon, the Editor of *The Farm Quarterly*, presents in short essays a summary account of the theories, practice, and lives of eighteen key figures in the development of agriculture since the seventeenth century. Mechanical inventions (Jethro Tull's seed drill, Eli Whitney's cotton gin), chemical discoveries (Lavoisier's work with oxygen, von Liebig's production of fertilizer), conceptual revolutions (Linnaeus' nomenclature, Mendel's genetics), and practical innovations (Robert Bakewell's

breeding for livestock types, Arthur Young's emphasis on the importance of crop rotation) are discussed. The briefness and clarity of the book make this a useful introduction for intelligent young people. HARVEY A. SIMMONDS

NEWS, NOTES, AND COMMENTS

(from page 159)

effect of light on phytochrome, the protein substance found in all plants, which triggers flowering. Phytochrome is a light-sensitive plant pigment; thus, by altering the light to which a plant is exposed, the grower can alter the plant's flowering pattern.

Flower plants can also be made more compact or, in some cases, elongated through the use of some new chemicals. Among these are "B-Nine," phosfon, and "Cycocel." These are already being used commercially to shorten the stems of chrysanthemums, azaleas, and other plants, making them more satisfactory as indoor ornamentals.

Azaleas sprayed with "Cycocel" and grown for two months at 60°F., then two months at 50°F., flowered six weeks later. The chemical retarded growth and promoted flowering.

One exhibit demonstrated that if the "well" or "vase" of the pineapple is filled with B. hydroxyethyl hydrazine (liquid rocket fuel) the fruit will develop six months later.

Some of the plants brought back by Dr. John Creech and Dr. Donald H. Scott from their 1963 plant exploration trip to Russia, and from Dr. Creech's earlier trips to Japan and China, were also shown. After further testing by the Crops Research Division, the plants will be released to commercial growers for propagation and then, as stock becomes adequate, they will be made available to the public.

Reception for Graduates. On June 11, 1964, twenty-five students received certificates upon satisfactory completion of their work in the two-year courses offered by The New York Botanical Garden, in the presence of relatives and friends in the Auditorium of the Museum and Administration Building.

T. H. Everett, Assistant Director (Horticulture) and Senior Curator of Education, introduced Dr. William C. Steere, Director, who responded with a few words of welcome; Rodney Wilcox Jones, guest speaker, whose topic was "Getting the Most Out of Life"—an illustrated talk on Mr. and Mrs. Jones's collection of plants at their New Rochelle, New York, home and their world-wide travels; and Henry de la Montagne, Assistant Director, Emeritus, and member of the Board of Managers of the Garden. Mr. de la Montagne, after briefly reviewing the history of the Garden's educational program, presented the certificates:

in Botany—Max S. Levine, Sue Levine, and Helen Ziegel;

in Practical Gardening—Herbert Abramowitz, Mathew J. Cwelich, Thomas Eaton, Bernard Glinski, Buddie W. Kane, Jr., Lewis G. Neiberg, Charles J. Oppenheim, Elizabeth A. Parker, Letitia Ide Ratner, Jordan M. Schiffman, Corinne Spellman, Cornelius van Helden, and Frances Stent Woods;

in Landscape Gardening—John P. Anderson, Charles Baiano, Jacqueline Bree, William Lucian Cahill, Carolyn S. Hirsch, John Matarese, Jean Mazabras, Lucy L. Pascoe, Kate Taplinger.

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The Great Swamp National Wildlife Refuge in Morris County, New Jersey, was dedicated by Secretary of the Interior Stewart L. Udall on May 29, 1964. The ceremony took place on the M. Hartley Dodge Estate in New Vernon, overlooking the Great Swamp, and honored the late Mr. Dodge, industrialist, philanthropist, and conservationist, who played a major part in its preservation.

The dedication marked more than five years of effort by the Great Swamp Committee of the North American Wildlife Foundation to preserve this wilderness of marshland and forests. One of the foremost conservation projects in the United States, it is a notable example of federal, county, and private cooperation. Over one million dollars has been contributed by 6,100 individuals and 462 organizations, industries, and foundations from 289 communities in twenty nine states.

Twenty-six hundred acres of a minimum three thousand acres have been deeded to the United States Department of Interior. The remaining acreage is expected to be obtained shortly and transferred to the Department.

The American Dahlia Society celebrates its fiftieth Anniversary this year. One of the features of the celebration will be a "World's Dahlia Congress," to be held in conjunction with a two-day dahlia exhibition at the New Yorker Hotel, in New York City, the week of September 14 to 20. Dahlia enthusiasts from forty states and Canada, as well as from several European countries, Japan, Australia, and South Africa will attend. Two chartered planes will bring delegates from the National Dahlia Society in England.

Some three hundred and forty classes are included in the show schedule. To the usual awards have been added special gold trophies in honor of the theme, "The Golden Year of the Dahlia." The Dahlia Society of New Jersey will join the American Dahlia Society in staging the exhibition.

At the "Golden Anniversary" Banquet on September 19, the National Dahlia Society of England will present its first gold medal to the American Dahlia Society in recognition of its achievements.

The Santa Barbara Botanic Garden has just published a new number of its *Leaflets*, entitled "Seed Propagation of Native California Plants." Written by Dara Emery, Horticulturist at the Garden, this booklet will be useful to both home gardeners and professional propagators who are interested in growing native plants not readily available in the nursery trade.

The sixteen-page leaflet is divided into two parts. The first on seed propagation includes methods of collecting and cleaning seeds, special treatments to break dormancy, sowing and transplanting methods. The second part is a list of recommended seed treatments for over three hundred species of native plants.

The result of many years of experience in growing California plants at the Santa Barbara Botanic Garden, Mr. Emery's paper outlines special treatments and the plants to which they should be applied.

Copies can be ordered from the Santa Barbara Botanic Garden, Santa Barbara, California, at fifty cents each.

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THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

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THE NEW YORK BOTANICAL GARDEN

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THE GARDEN JOURNAL

DOROTHY EBEL HANSELL, *Editor*

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STRYBING ARBORETUM

Golden Gate Park, San Francisco

By P. H. BRYDON

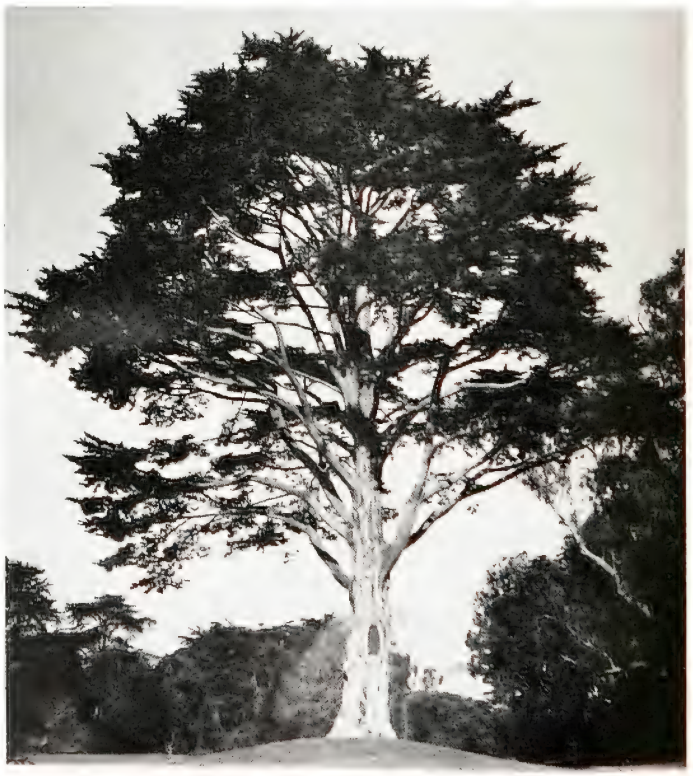
Percy Hadden Brydon received his early education at Edinburgh, Scotland, where he attended East of Scotland College of Agriculture and the Royal Botanic Garden; then was trained as a nurseryman and seedsman with Messrs. Dobbie & Company in that city. Mr. Brydon came to the United States in 1927. For ten years he was Manager of the University of California Botanical Garden at Berkeley, and for two years lecturer on plant propagation for the University of California Extension Division; after that he owned and operated a rhododendron and rare plant nursery in Oregon and soft fruit orchards in Washington. He has been Director of the Strybing Arboretum for the past four years. He is Editor of the *California Horticultural Society Journal*, and a Director of the American Horticultural Society and of the Saratoga Horticultural Foundation.

IN 1868, eleven hundred and forty acres of land extending from Divisadero Street to the Pacific Ocean were acquired by the City and County of San Francisco, and eventually became Golden Gate Park. The vision of William Hammond Hall, Superintendent from 1871 to 1887, and the skill of John McLaren, Superintendent from 1887 to 1943, created one of the world's finest parks from this narrow rectangle of shifting sand. Both men had dreams of establishing an arboretum within the park, but it was not until 1937, when money from the Helene Strybing bequest was made available, that their dream became a reality.

The physical development of the area that now contains the Strybing Arboretum approximates that of Golden Gate Park. In the beginning, the problems faced by Hall and McLaren were: 1) to tie down the constantly moving sand; 2) to provide a growing medium for trees and shrubs; and 3) to select species sufficiently hardy to withstand the ocean winds and thrive in a soil predominantly sand. Success in tying down the sand was finally achieved by planting beach grass *(Ammophila arenaria)*, seeds of which were imported from Europe where it had proven to be an effective soil binder along the seashores. Once the terrain had become stabilized, loam by the trainload was hauled into Golden Gate Park and augmented with animal fertilizer from the street sweepings of that era. A wide variety of trees and shrubs were planted, yet of the hundreds which were tried, it remained for the native Monterey cypress *(Cupressus macrocarpa)* and Monterey pine *(Pinus radiata)* to make themselves at home in the windswept conditions of western San Francisco. In addition to the native trees, *Eucalyptus globulus, E. viminalis, Acacia* species, and *Leptospermum* species proved to be invaluable, and today the major windbreaks and shade areas in the Strybing Arboretum are provided by these species.

Left. Santa Lucia fir, *Abies bracteata*, with the typical spirelike crown of an older specimen.

Below. A sixty-foot specimen of Monterey cypress, *Cupressus macrocarpa*, near the main entrance to the Arboretum.



Above. The ten-inch, pink flowers of *Magnolia campbellii*, as they were opening on February 1, 1964.

Right. The staminate catkins, thirteen inches long, of *Garrya elliptica* 'James Roof', on February 1, 1963.

Weather conditions in the Arboretum are equable and allow great latitude in the variety of plants which can be grown out of doors. A combination of sea fog and low stratus clouds, carried across the northern tip of the peninsula by westerly winds, has prompted the Weather Bureau to state that "San Francisco [is] known as the air-conditioned city with cool pleasant summers and mild winters. Flowers bloom throughout the year, and warm clothing is needed in every month." They further state that the sun shines, on an average, 66 per cent of the daylight hours in downtown San Francisco. However, in the Arboretum, this percentage is considerably reduced because there is greater frequency and longer duration of fogs on the western or coastal side of the city. The average yearly maximum temperature is 62.7°F., with an average minimum of 50.6°F. The highest recorded temperature was 97°F. in September, 1939, and the lowest was 30° in January, 1937. The average yearly precipitation since 1905 is 21.75 inches, and 84 per cent of this falls between November and March. The tranquil climate of the Arboretum is apparent by the fact that there are growing out of doors such diverse plant types as cacti and succulents from the desert areas of the world, tree ferns from Australia and New Zealand, rhododendrons from the subtropical rain forests of southwestern China, alpines from the mountains of Europe, and ephemeral annuals from California.

When Eric Walther was appointed Strybing Arboretum's first Director by John McLaren in 1937, the Arboretum was already equipped with a sizable collection of botanical and horticultural rarities. These had been gathered from material introduced and propagated by Golden Gate Park Nursery. With the help of W.P.A. labor and less than one thousand dollars from the Strybing bequest, Mr. Walther developed the first unit of four and one half acres. In an effort to simplify maintenance, he arranged the plants in a geographical sequence by grouping together plants from similar climates.

This segregation of species presents an interesting display from the standpoint of both cultural needs and educational value, the only unfavorable factor being that, unless there is sufficient space in reserve for future accessions, it becomes impossible to augment the existing collections of genera and species if the geographic scheme is to be retained. Today, the Arboretum is sixty-four acres in extent and has been made reasonably secure against vandalism and theft by an eight-foot, chain-link fence around its perimeter. In her will, Mrs. Strybing requested that "plants be properly labeled for the purpose of information and instruction." This has been the responsibility of Arthur Menzies, Supervisor of Plant Accessions, and he is doing an admirable job. To date over five thousand accessions have been recorded, and embossed plastic labels identify over three thousands plants in the various collections.

In 1960, a master plan indicating major roadways and topographical improvements was designed by Robert Tetlow, Landscape Architect. The first phase, consisting of about twenty acres, was completed in the spring of 1963. The second and final phase is now being prepared; when

finished, it will provide a new and improved traffic pattern which will give access to hitherto undeveloped areas.

As the visitor enters the Arboretum through the new gateway adjacent to the Hall of Flowers, the fountain is visible in the distance against a dark background of Monterey cypress. To the left is a long, deep border protected from prevailing winds and afternoon sun by tall Monterey pines, Monterey cypress, and eucalyptus. This border and adjoining areas have been reserved for the Magnolia Family. Seventy-nine plants, representing twenty-three species and varieties, have been planted and include such interesting magnolia relatives as *Talauma, Michelia, Illicium, Liriodendron, Kadsura,* and *Drimys.* The bulk of the planting is composed of spectacular Oriental species and varieties, such as *Magnolia campbellii, M. sargentiana* var. *robusta, M. sprengeri* var. *diva, M. denudata, M. dawsoniana,* and the hybrid *M.* × *veitchii.* To these will be added a collection of the *M.* × *soulangiana* varieties and color forms of *M. stellata.* Among the rarer species of *Magnolia* in this area are *M. nitida, M. cylindrica,* and *M. delavayi.* All told, there are thirty species and thirty-three hybrids or clones of magnolias in the Arboretum. The oldest specimens were planted in 1937 by Eric Walther and provide a magnificent display in February and March.

A collection of flowering crab-apples, totaling one hundred and five trees and thirty-five varieties, has been planted on either side of the fountain which lies to the north of the magnolia section. In time these will provide a continuity of color to follow the earlier magnolia display and, as they mature, will allow a determination of the best varieties for the San Francisco area.

A path bisecting the crab-apple collection leads directly to the rhododendron test area, which is being developed with the enthusiastic support of the California Chapter of the American Rhododendron Society. The purpose of this area is to grow and display rhododendrons deemed suitable for San Francisco gardens, particularly those species which can not be grown out of doors in colder climates. There are few places in the United States where species and hybrids of the Maddenii Series do better than in Golden Gate Park. The glorious displays of *R.* 'Fragrantissimum', *R.* 'Princess Alice', *R. maddenii, R. crassum, R. nuttallii,* and *R. burmanicum* delight the visitor in the spring. At present, we are particularly interested in a number of species which are being grown from seeds collected in New Guinea by Dr. H. Sleumer, Senior Curator of the Rijksherbarium, Leiden, Holland. These species are popularly included in the so-called Javanicum group and, while considered tender in Great Britain, some of them might prove hardy out of doors in protected locations in the Arboretum. Since the species belonging to the Javanicum Series are lepidote and possess a wide color range, it is possible that they may cross with members of the Maddenii Series, the species of which are predominantly white and fragrant. Certainly it is worthy of a try. In addition to species of the Maddenii and Javanicum Series, two hundred and thirty species are being propagated for eventual trial in the rhododendron test area.

In the older portion of the Arboretum, where the geographical pattern is still maintained, many fine specimens of ornamentals are to be seen. Each spring, in the Australian section, the Lilly Pilly tree *(Acmena smithii)* delights the visitors with its masses of light purple fruits, and not far off the curious brown flowers of *Boronia megastigma* fills the air with heady perfume. Down the pathways in the Chilean section, *Puya chilensis* sends up its huge "asparagus stalks" of rich green, which eventually reach twelve feet in height and in April produce four-foot inflorescences of greenish yellow flowers. At the end of a grass panel on the main axis of the Arboretum, there are several magnificent specimens of Torrey pines *(Pinus torreyana)* over sixty feet tall; their trunks are forty-three inches in diameter at two feet above ground level. At the base of one is a bold planting of

Skunk-cabbage *(Lysichiton americanum),* lady-fern *(Athyrium filix-femina),* and trunks of coastal redwood (Sequoia sempervirens).

A shady path, part of the Rhododendron Test Area in the Strybing Arboretum.

Gunnera chilensis with lush tropical foliage, reminiscent of a giant rhubarb. Nearby is a section devoted to plants from China, Japan, and the Himalaya Mountains, and here the dove tree *(Davidia involucrata)* never fails to attract attention in late April and early May, when the numerous fluttering white bracts cover the tree and give the impression of a flock of doves resting on its branches. Major topographic and road changes are indicated in this section of the master plan, and as many specimen plants as can be moved are being relocated in other parts of the Arboretum. Fortunately, grading changes do not affect a fine old specimen of the Santa Lucia fir *(Abies bracteata),* which carries its slender spire over fifty feet high, quite unlike the beautifully symmetrical younger specimens in other parts of the Arboretum.

One of the conditions of Mrs. Strybing's bequest was that the Arboretum contain plants native to and characteristic of California. Consequently, five acres have been devoted to native plants, and over three hundred species are displayed in the recently installed California area. Because of current interest in the ornamental value of *Ceanothus* and *Arctostaphylos,* the clonal forms of these two genera form an important part of the plantings. In the past four years, Mr. Menzies has gathered together seventy-one species, varieties, and hybrids of *Arctostaphylos,* many showing promise as valuable additions for the home garden. Within the California area is a small grove of coastal redwoods *(Sequoia sempervirens)* which was planted about 1890. Beneath them the Redwood Trail, a recent innovation, has been designed for the study of the unique flora of our coastal redwood forests. It contains one hundred and twenty native associates, all clearly labeled, and along the trail are markers with legends to interest the student. Within the Redwood Trail area an outdoor classroom, with a seating capacity of seventy-five, offers a quiet retreat for instruction. It is frequently used during the spring months when the trilliums, erythroniums, and iris are in bloom.

A secluded spot in the Redwood Trail where grade school children and garden clubs meet on sunny days.

Over three thousand labels now identify plants in the Strybing Arboretum.

The late James Noble was a keen collector of dwarf conifers, and he possessed one of the most complete assortments in the United States. Some were sent to the famous Gotelli garden in New Jersey and have since found a sanctuary in the United States National Arboretum, Washington, D. C. When Mr. Noble died, his widow, Mrs. Effie V. Noble, very generously presented three hundred and seventy-two species, varieties, and cultivars to the Strybing Arboretum; they are now established in the rock garden, clearly labeled, and thriving in the cool San Francisco climate. Included in the plantings are thirty forms of Lawson cypress, *(Chamaecyparis lawsoniana)* and twenty-four forms of Hinoki cypress *(Chamaecyparis obtusa).* Rare and unusual dwarf pines, cedars, cryptomerias, and redwoods amaze the visitors who, more often than not, believe them to be artificially dwarfed in the bonsai tradition. A full account of the dwarf conifers in the Arboretum was published by Arthur Menzies in the winter issue of the *University of Washington Arboretum Bulletin.*

The Hall of Flowers is the beginning of a garden center to provide home owners with visual and informative demonstrations which will assist them in making their home surroundings more attractive. Within the buildings are the offices of the Strybing Arboretum, a horticultural library, a recreation room, auditorium, and long gallery with two workrooms for the preparation of floral displays. While the Hall of Flowers was designed primarily for flower shows and related horticultural activities, civic and cultural organizations are allowed to use the facilities, provided they do not conflict with scheduled flower shows and garden club meetings. During the fiscal year of 1962-63, the total attendance was 119,902 representing one hundred and twenty horticultural and one hundred and sixty civic activities. The next step in the garden center plan is the proposed Strybing Arboretum-*Sunset Magazine* Demonstration Gardens to be located on a two-acre area adjacent to the Hall of Flowers. The primary object of the Demonstration Gar-

(Continued on page 183)

WATER GARDENING

By George Leicester Thomas, Jr.

Dr. Thomas, with his two sons, operates one of the world's largest ornamental fish and aquatic plant farms at Lilypons in Frederick County, Maryland. Founded by Dr. Thomas's father in 1917, it now has such an extensive volume of mail, that it maintains its own post office.
Dr. Thomas was awarded a Doctorate in Commercial Science by Franklin and Marshall College, of Lancaster, Pennsylvania, in 1952. He is author of *Garden Pools, Water-lilies and Goldfish*, (Van Nostrand) and of numerous botanical and ichthyological articles.

AMONG THE FIRST beautiful things seen by man on this earth were water-lilies, for remains of plants found in pre-Ice Age strata in Europe indicate these flowers existed before civilized man is known to have evolved.

Man's earliest attempts at art and letters reflect his appreciation of that beauty. From the furled sepals of the lotus bud he conceived the shape of the Ionic capital. From the twining stems of water-lilies he developed the Greek fret. Doubled upon itself, the fret forms the swastika, one of the most ancient written symbols for earth's balance of life and death, darkness and light, peace and conflict.

The Water-lily Family, *Nymphaeaceae,* has different genera of many flowering aquatic plants which have been called water-lilies. There is the genus *Nuphar,* the inferior blooms of which are called cow-lilies, spatter docks or yellow pond-lilies. The genus *Victoria,* of which the spectacular *Victoria regia* is a species, is another. There is the genus *Nelumbium,* to which the lotus forms belong. But it is the genus *Nymphaea* from which all true water-lilies spring.

Five subgenera under *Nymphaea* cover the principal aquatic blooms popular in water gardening today. They include the hardy water-lilies *(Castalia)* which are perennial and bloom in the daytime; *Anecphya* and *Brachyceras,* the tropical and (in practical application) annual water-lilies which bloom in the daytime; *Lotos* and *Hydrocallis,* tropical water-lilies (also annuals in common usage) which bloom at night. In catalog listings, be careful not to confuse the flowers of the night-blooming *Lotos* (subgenus) with blossome of the genus *Nelumbium* and its lotus species.

Ancient as the water-lilies are, their cultivation goes back only about a hundred years, and their really wide popularity less than half that time.

Most members of this botanical family had been noted and classified when an exotic fifteen-inch bloom, borne on the water amid floating pads seven to eight feet in diameter, was discovered in Bolivia in 1801. For the next three decades other botanists in other parts of South America reported similar finds, and seeds of these strange plants were sent to England. It was not until 1849 that the seeds could be nurtured in man-made surroundings successfully enough to bring them to bloom. The plant was named at registry for the then reigning queen—*Victoria regia.*

Cultivating the *Victoria regia* was a pursuit for only the wealthy. For its tremendous spread of floating foliage, the plant required a basin at least thirty feet in diameter, three feet deep at the center. Its roots drew sustenance from a

The bloom of The Manchurean lotus, six to eight inches across, is frequently borne higher than a man's head.

The leaf of a tropical water-lily sprouts a miniature water-lily plant. This viviparous type is confined to the day-blooming tropicals.

mixture of loam and fertilizer in a container at least twelve feet square, eighteen inches deep. Moreover, the basin water had to be warmed through much of the growing period (seeds planted in January developed to blooming plants in August—sometimes) to simulate the native tropical setting of the royal water-lily.

A practical and less expensive version of the hobby evolved. This was the cultivation of hardy and tropical water-lilies which thrive in small pools with only the sun to warm them. Soon the yards of homes and the grounds of estates in England became dotted with small water-lily pools similar to those which flower lovers build and enjoy today.

A water-lily pool is a quick and simple structure to build. Ideally, it is a shell of reinforced concrete six inches thick, set into the lawn so that an inch of the shell extends above ground level to keep out surface water during rainstorms. It is eighteen inches deep. The shape and size depend upon the owner's wishes—square, rectangular, round, oval, free-form. The only prerequisite is that the site must be one which receives at least four hours of sun a day. If flowers of any kind are now growing on a proposed pool site, then water-lilies will thrive there.

At one time new pools required a long period of seasoning, for the free lime in the new concrete dissolved in the water and made it poisonous to both goldfish and aquatic plants. By experimentation, I found the following method highly satisfactory for curing a new pool in ten days:

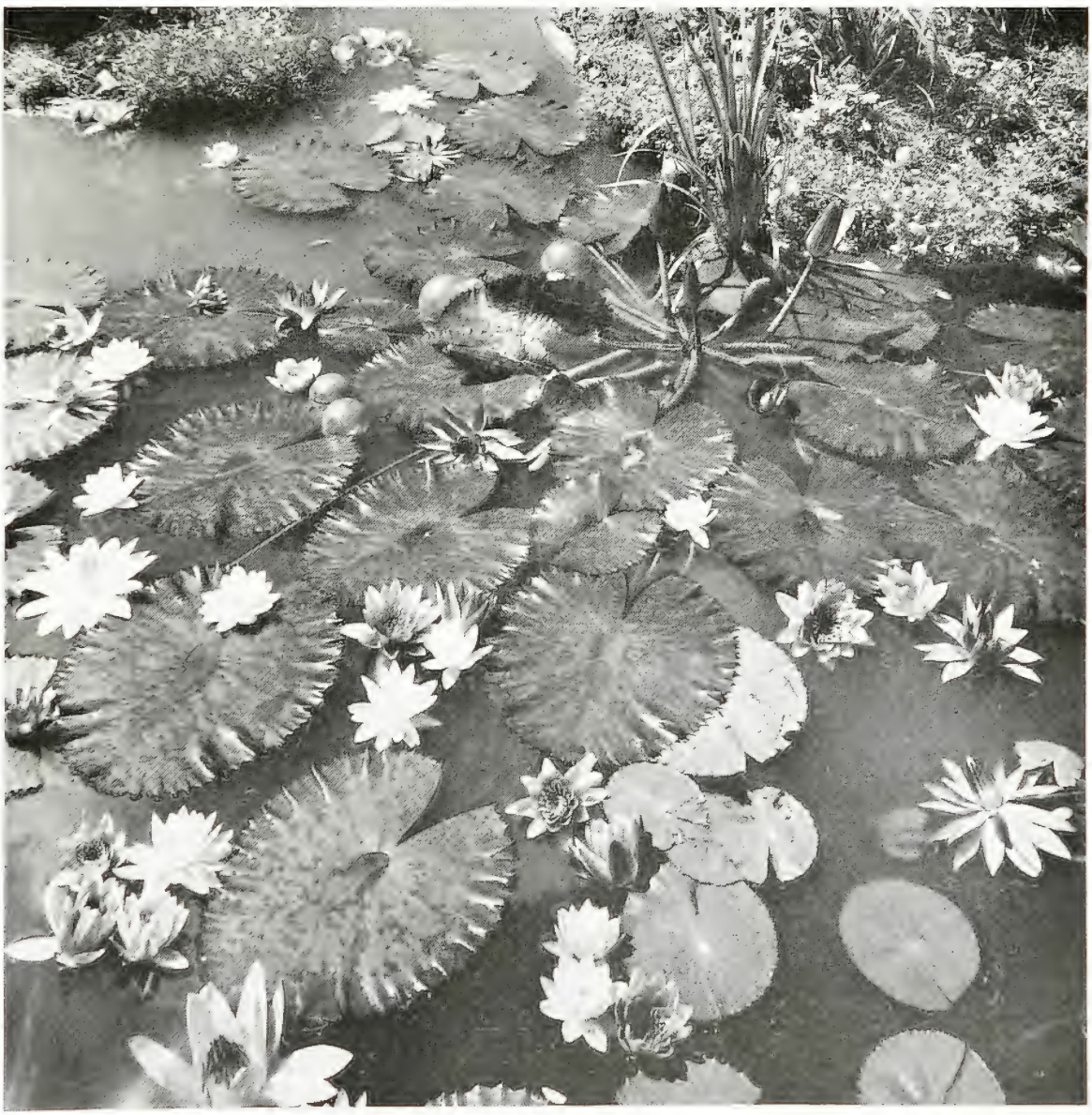
Keep the pool filled five days.

Drain, and refill for another five days.

Drain, and with a quart of kitchen vinegar mixed into ten quarts of water, scrub the pool walls and floor with an old broom.

Rinse away the vinegar mixture with a brisk stream from a garden hose and fill with fresh water. The pool is now ready to receive goldfish and water-lilies.

Those first water gardens in England must have been refreshing, but somewhat pale by today's standards. There was practically no color. Europe's most widely distributed native hardy species was *Nymphaea alba,* a cup-shaped, snow-white bloom which floated prettily upon the water. *N. odorata,* a North American species, which Englishmen quickly began to import, is also white in its pure form, although a chance form of it—*N. odorata rosea,* called the Cape Cod pink water-lily—blooms with a light blush of



An assortment of water-lilies in the large pool garden at the home of E. K. Van Swearigen in Alexandria, Virginia.

pink. A northwestern American species, *N. tuberosa,* offered a pretty bloom and sweet fragrance, but it bore only white blossoms.

There were a few colorful varieties, but they were temperamental to grow or expensive. *N. alba rubra,* a Swedish variety, produced deep red flowers. A Mexican species, *N. mexicana,* bore bright yellow blossoms.

Then, from the late 1880's until the beginning of this century, a botanical genius named Latour-Marliac, who lived at Temple-sur-Lot in the south of France, began crossing European, North American, and other species. And he produced scores of colorful hardy hybrids. For one group of new blooms, the Marliacea, the hybridist is thought to have crossed the Cape Cod water-lily (the pink variety of *N. odorata*) and *N. alba,* Europe's white water-lily. Another group, the Laydekeri, he is believed to have developed from *N. alba rubra* and varieties of *N. tetragona,* a Far Eastern species.

However he worked—his secrets died with him in 1911—he produced a vivid field of color among the hardy varieties—pinks, reds, crimsons, yellows, bronzes, every color except blue, a hue which still has not been achieved among them. Almost all these varieties are easily propagated, so Marliac's bright colors are here to stay. I know of no man whose memory is commemorated by a more beautiful and lasting monument.

Many southern sections of Europe would lend themselves very well to the cultivation of day-blooming and night-blooming tropical water-lilies, natives of Africa and South America, but these forms have never been as popular there as in the United States.

Tropical water-lilies, like the hardy water-lilies, have undergone considerable change in the past few years. Once they occurred in a range of all hues except yellow, and there were no whites. It remained for Dr. George H. Pring, English by birth, American by adoption, to produce the first really dependable yellow and white forms at the Missouri Botanical Garden in St. Louis.

Today tens of thousand of Americans brighten the landscape around their homes with water gardens. A garden pool is an inexpensive and simple hobby, and a versatile one. It lends itself in large dimension to the grounds around a big home or on a small scale to the split-level house in the suburbs. A water-lily pool may cover as much area as a tennis court or a living-room rug; or, in a small yard, a sunken wooden tub with one water-lily and a few goldfish may fit admirably into a space no larger than that required for a lawn chair.

Prefabricated plastic pools, offered in a wide range of sizes and shapes, provide a simplified approach to water gardening. Lighting fixtures especially designed to point up the water garden at night widen the possibilities in home decorating.

Here are the three types of water-lilies for the pool:

The hardy water-lily, a perennial, is planted in a cubic-foot or more (a five-gallon cedar pail is ideal) of soil mixture, consisting of three parts of good garden loam and one part of well-rotted cow manure, and is set into the pool with about a foot of water over the root crown as soon as warm weather becomes established, mid-April or early May.

The plant will begin to bear in July, opening its blooms in late forenoon, closing them in late afternoon. A bloom lasts three or four days; by the time one is gone, another should be opening. The plant quits blooming with frost and may be lowered to the bottom of the pool for the winter. If the ice does not freeze deeply enough to touch the root, the plant will burst into new life the following summer.

Pads of the hardy kinds have smooth edges. Most of the blooms float, many of them are fragrant. They range from white through the many tints and shades of every color except blue. Some flowers are no larger than a half-dollar, some are the size of dinner plates.

Tropical water-lilies must be treated as annuals, for few amateur gardeners can store them successfuly through the winter. They produce larger, fluted, scalloped leaves and bigger blooms; therefore, they need half again as much soil (same mixture) as that given the hardy water-lilies. They must be set out six weeks later than the latter. They will, however, bloom long after frost. In Lilypons, Maryland, I have seen tropical water-lilies blooming on Thanksgiving Day.

Tropicals, planted with the root-crown eight inches under the surface of the water, have floating leaves, but the blooms are held erect on stiff stems. They are of all hues, including blues and purples, but there are few yellows.

Day-blooming tropicals, which are fragrant, bloom from forenoon to late afternoon the same as the hardy varieties. Night-blooming tropicals — only a few have fragrance — open their blossoms at dusk and close in the following forenoon.

Day-blooming tropicals are viviparous, an interesting characteristic which endears them to many fanciers. They bear offshoots in the form of miniature plants and blooms which sprout from an umbilicus at the center of mature leaves. The tiny plants, if potted, grow quickly to become mature, healthy water-lilies.

The lotus, a towering plant higher than a man, with parasol-shaped leaves and white, yellow, pink, varicolored or deep red blooms, can also be grown in a water-lily pool. It requires a half-tub of the water-lily soil mixture, further enriched by a two-inch layer of cow manure on the bottom. It thrives with a few inches of water covering the root-

crown. Its blooms, which release a heady, exotic fragrance, are as large as a man's hat. Blooming habits are the same as those of the hardy water-lilies.

Goldfish add far more to a garden pool than flicking, darting flashes of color and life. Fish can live in a pool which has no plant life, and water-lilies can live in a pool which has no fish, but neither can flourish without the other. Plants principally take carbon dioxide from the water, converting it to tissue, and release oxygen; fish take oxygen and return carbon dioxide, completing a cycle which helps to keep pool water fresh and clear. As we know them, goldfish are not normal life forms, accidents of nature, nor developments made by man, but a combination of all three.

The basic goldfish breed is *Carassius auratus,* the common goldfish which at birth is silvery olive-gray. The breed has a tendency to revert to varied inherent mutations in both color and physical shape. Through segregating and cross-breeding these mutant forms, the Chinese, Japanese, and Koreans have succeeded down through the centuries in developing fish with bulging eyes (the telescopes), odd tail and fin formations, and a wide variety of colors and color patterns.

Here are the more popular water-garden varieties:

Common goldfish, hardy enough to live through the winter in an outdoor pool if not frozen solidly in the ice. Silvery albinos of this form are called Pearls. Those which develop a brass instead of the familiar red-gold color are called Canaries. Red-golds with black spots are often sold as Orioles.

The Japanese Fantail has a squat body, with showy fin and tail developments. It swims slowly, regally, and adds to the beauty of a pool.

The Comet, with fins and tail long, flowing, and graceful, gets its name from its shape, not its speed.

Shubunkins are scaleless fish, their colors mottled patterns of red, black, blue, yellow, brown, and lavender upon a pearl or pale blue background.

Other varieties—including the telescopes and black Moors—are delightful in an aquarium, but are neither large nor bright enough to show up well in an outdoor pool.

Add to the goldfish and water-lilies in a pool a few submerged and floating plants, which serve a double purpose. They provide natural greenery, which makes a fine backdrop for the loveliness of the water-lily blooms, and food, shelter, and additional oxygen for the ever-darting fish.

THE LIZARD'S TAIL

By Charles O. Masters

Mr. Masters, whose vocation is sales with Matheson Scientific of Cleveland, finds relaxation in farming and writing on aquatic plants and animals for those who are interested in gardens and aquariums.

Of all the plants growing in the marshes and wet woodlands of the United States, the lizard's tail, *Saururus cernuus* L. is one of the most prolific.

In spite of the fact that it is a rather tall plant, occasionally up to five feet, and the stems at the level of the ground are sometimes over a half inch in diameter, there are as many as eighteen separate plants per square foot of soil. Subterranean stems or rhizomes from one to three inches below its surface may average thirteen linear feet for each square foot of soil or over one hundred miles for each acre.

The leaves, dark green in color, are heart-shaped, three to six inches long and two to three and a half inches wide, and quite thin. Root-stocks, which have a very characteristic aromatic odor, are long and slender; hairy when young, but becoming very smooth as the plant gets older. From the appearance of the terminal spike of the stem, drooping in flower, comes the name lizard's tail. The gracefully arched spike, about four to six inches in length, is very densely packed with fragrant, small, white flowers which continue to form from late May through August. It very definitely resembles the general tail structure of the common lizards of our American West.

Lizard's tail plants are quite often sold in England as American swamp-lilies for use as decoratives in water-lily pools. They do well along the open wet edges and are much in demand along with *Saururus loureiri* Decaisne, the similar Chinese species. Both are considerably smaller when cultivated than the plants growing wild. They are members of the Dicotyledons, Family *Saururaceae,* from the Greek words sauros for lizard and oura meaning tail. A closely related species but somewhat different in structure is *Anemopsis californica* (Nutt.) Hook. and Arn. from the West Coast.

Lizard's tails are most abundant where the water is from two to six inches in depth but can withstand complete inundation for rather long periods of time. They grow best in full sunlight, usually forming a complete stand of the one species since they are so highly efficient as a competitor in the plant world. The only other two plants which stand any chance at all with the species are the smartweed, *Persicaria hydropiperoides* Michx., and the arrow-arum, *Peltandra virginica* (L.) Kunth, which are sometimes found growing in association with the lizard's tails.

Only one species of the genus is known in eastern North America and only one in Asia, with no representatives at all in Europe. The plant is extremely hardy and does well from New England down the coast to Florida, westward to Minnesota and Texas, gradually becoming less common

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The lizard's tail, *Saururus cernuus*

SOME USES OF VARIEGATION

By JUNE R. HENDERSON

Mrs. (Peronneau Finley) Henderson, horticulturist, author, and lecturer, writes about the plants she grows in her lovely garden in Aiken, South Carolina.

WHILE WALKING through the grounds of an area which had been established for some years, I was attracted to a mass planting of the gold-dust variety of aucuba, *A. japonica variegata.* Tall-growing mahonia and the solid green-leaf variety of aucuba made an interesting background and furnished a striking contrast as well as an excellent example of how color effects can be achieved in a garden with foliage rather than with flowers.

There are some shrubs whose variegated forms furnish great beauty, and by using these discriminately, very subtle and unusual garden effects can be obtained. The same mistake, however, can be made in foliage planting as in flower planting—one must avoid spottiness. There are places where a striking specimen can be a very useful feature; but for the most part masses of variegated foliage are more desirable.

If given good drainage, the aucubas, which were mentioned in a previous paragraph, will grow in shaded locations where few other shrubs thrive. In fact, deep shade is essential if they are to flourish and attain their greatest potential. At maturity these plants reach heights from five and six to ten feet and produce wonderfully handsome leaves which vary widely in their markings. Some home gardeners prefer the plain dark green leaves, but I feel that the variegated variety brightens the darkness of a shaded walk. This is a very disease-free plant group, whose members are cold-hardy as far north as Washington, D. C. The aucubas will grow in colder climates if given some protection.

Another foliage plant which grows in much the same area as the aucubas is a variety of pittosporum, *P. tobira variegatam.* Its thin, green leaves are variegated with white, and a single specimen makes a very desirable garden accent, for it has the quality of picking up and reflecting light. An interesting feature of this shrub is the termination of its branches into whorls and umbels. These are used by flower arrangers who consider them valuable in their compositions.

There are several species of *Pittosporum* which have originated in widely scattered places—New Zealand, Australia, China, Japan, and South Africa. They are fairly easily cultivated and are of varying degrees of cold-hardiness. The pittosporums lend themselves to excellent garden use; some make good hedge material, while others are beautiful as ornamentals.

Throughout the Southeastern States is found a very fine and useful evergreen, *Elaeagnus* in its numerous varieties. This plant is deciduous in colder climates, but wherever it grows is a handsome addition to any shrub planting, valuable for its foliage and interesting fruit. *Elaeagnus pungens variegata* is one of the most attractive of all the variegated evergreens, having large leaves with deep yellow centers and green margins. The young growth is particularly pleasing, and before the leaves reach maturity, they are the color of gold-dust. This shrub is a vigorous grower and should be watched. Periodically it produces strong shoots with plain green leaves; unless these shoots are cut off at the main branch, the entire shrub in a short time will show no variegation. *E. simoni tricolor,* whose leaves are variegated with yellow and pinkish white, is sometime listed, but it is not found growing in gardens to any extent.

Another genus, *Evonymus* or *Euonymus*, as it is generally spelled, is made up of a number of species and varieties which vary widely in form. For instance, *E. fortunei*, formerely known as *E. radicans*, is a trailing shrub which sometimes climbs to a height of twenty feet, while the native strawberry-bush, properly termed *Euonymus americana*, is a deciduous shrub to eight feet. The species which lends itself for general garden use, as it is very variable, is *E. japonicus.* This upright shrub tolerates cold temperatures quite far north, and there are several varieties which have variegated leaves; *argenteo-variegatus* has leaves edged and marked white, while *aureo-variegatus* has leaves blotched yellow.

Euonymus offers valuable material for garden design, since there is such a diversity in manner of growth and form, and since it is not exacting as to growing conditions. While its members flourish under the right soil and climate, they will maintain good appearance under conditions where plants of less rugged constitution will not thrive. Euonymus is host to a very persistent scale, and this has sometimes discouraged the use of this otherwise desirable shrub. The scale can be controlled by a miscible oil spray applied in the early spring and again in early summer.

Rather more refined that the *Euonymus* group is the *Osmanthus.* In it is found some interesting variegation. The species *O. ilicifolia* claims the variety *argenteo-marginatus* in which the variegation is pure white. In addition to the beauty of its foliage, this osmanthus has the very acceptable characteristic of being quite resistant to cold and will grow much farther north than *O. fragrans* and some varieties so beloved in southern gardens.

Frequently *O. ilicifolia* is mistaken for holly, for the charming leaves have large, spiney teeth and are holly-like in appearance. On closer examination one sees that the leaves are opposite and not alternate as they grow on holly.

Holly, *Ilex,* has its own variegated members. These are found chiefly among the English hollies, *Ilex aquifolium,* and not among the American or Oriental ones. Since the English hollies grow best in this country in cooler areas, the Pacific Northwest and north of Washington, D.C., in the East, they furnish the finest variegated shrubs for northerly gardens. *Ilex aquifolium* is usually grouped as green-leaved and variegated, but it could be put into three groups for the variegation can be either silver or gold. The golds are said to be more numerous than the silvers, but most catalogs offer a rather wide choice. *I. aquifolium albo-marginata (argenteo-marginato)* and *I. aquifolium* 'Silver Leaf'

This arrangement, made by Mrs. Charles Ashley, consists of variegated varieties of the seven shrubs which are discussed by Mrs. Henderson: 1, acuba; 2, euonymus; 3, pittosporum; 4 and 5, privet; 6, eleagnus; and 7, hosta.

are satisfactory silver-marked forms; *I. aquifolium* 'Lily Gold' is one of the best gold-variegated kinds.

In studying plant material to find that which will yield groups of colorful foliage, one sees that many genera have some species or variety with interesting variegation. The ligustrums are numerous and have varied uses, and one of this group, *L. aureo-marginatum* (sometimes listed as a variety of *L. lucidum,* sometimes as a variety of *L. japonicum*) is an handsome shrub for a most satisfactory hedge.

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MY FRIENDS, THE WILDLINGS OF THE NEW YORK BOTANICAL GARDEN

By ARTHUR W. AMBLER

Mr. Ambler has for years been photographing wild flowers, birds, and other animals which are to be found at The New York Botanical Garden. He is a member of the Garden, also of The New York Zoological Society, and of the National Audubon Society.

Part VI—Autumn

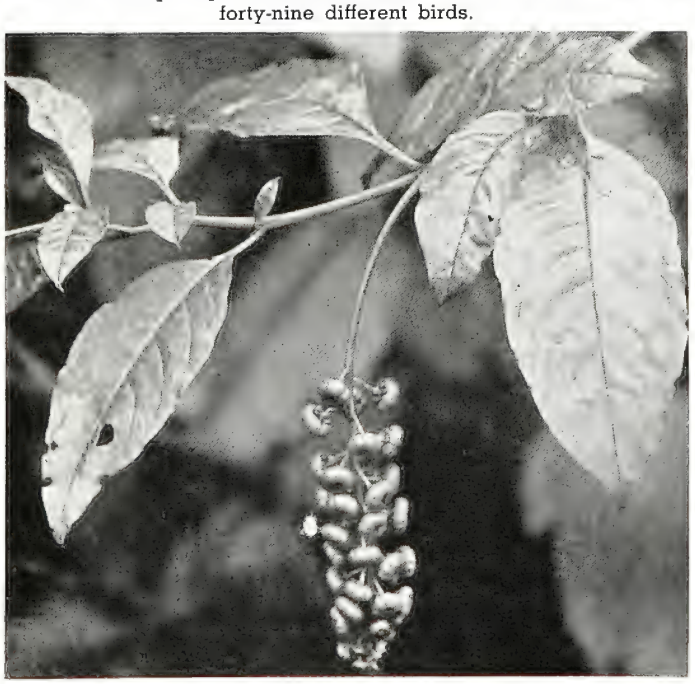
There is a beautiful spirit breathing now
Its mellow richness on the clustered trees,
And, from a beaker full of richest dyes,
Pouring new glory on the autumn woods,
And dipping in warm light the pillared clouds.
Longfellow

I DARE SAY there are few among us whose mind is not impressed with a sentiment of sadness as refulgent summer declines and its brilliant green is dimmed by age and tarnished by the rusty browns of autumn. We feel a chill in the air as daylight hours shorten, we see animals seeking shelter for their long hibernation, we catch the sound of birds, high above in the gathering darkness, winging their way southward.

Autumn is the twilight hour for vegetation, while cold winds and capricious sun and frost perform their ministry. But there is comfort in the thought that what we see waning is not the end, only a temporary respite, for after a winter's rest, all will be replenished. Such is the immortality of nature.

In early September little change in the transition from summer to autumn is noticable, because the sun is still warm and bright, though somewhat nearer the horizon. Some summer flowers still flourish as autumn flowers begin to unfold and take their place; but as the days pass, a progressive decline is discernible in vegetation, the pelage of mammals thickens to furnish warmth against the cold, and the color of the plumage of some birds changes so that they present a different appearance from that of spring. Even experienced bird watchers sometimes have difficulty in distinguishing with certainty one species from another.

Pokeberry, *Phytolacca americana*, is a favorite food of forty-nine different birds.



As I strolled through the grounds, I became aware of the absence of a number of birds which had frequented the Garden the past several months; here or there a laggard bird was seen, but it will soon follow its kind to the South. Several species of warblers are now scattered among the trees; having left their breeding grounds farther north, they stop briefly in the Garden before they continue their journey southward. Bird watchers, especially active at this time of year, hope to add to their check list the names of rarities and "accidentals," those birds, not indigenous to the locality, which have strayed from their usual route.

As if to fill the void caused by the departure of certain birds, I note the return of the slate-colored junco, fox sparrow, tree sparrow, and golden-crowned kinglet. These and others will spend the winter here.

I note, too, that the woodchuck is very fat and heavy; having feasted for several months on lush vegetation, he is prepared to survive on his body fat during hibernation. I am impressed by the industry of chipmunks as they scurry around, through brush and over and under logs, in search of nuts to store in deep burrows for winter use. Further proof that it is autumn and winter approaching is found in the starling *(Sturnus vulgaris)*. In spring and summer the bill of the adult is yellow, the plumage glossed with purple and green; in autumn and winter, the bill is dark and the plumage heavily speckled with white.

Perhaps the most obvious signs of autumn are in things botanical. The fresh blooms of asters, goldenrods, and gentians cavorting with summer's last flowers—butter and eggs or toadflax *(Linaria vulgaris)*, silver-rod *(Solidago bicolor)*, cardinal-flower *(Lobelia cardinalis)*, rattlesnake-root *(Prenanthes alba)*, thoroughwort *(Eupatorium perfoliatum)*, and sweet everlasting or white balsam *(Gnaphalium obtusifolium)*; the green of deciduous plants passing into vivid tints, until the last of the foliage falls and leaves the branches bare; the silky down of common thistle *(Cirsium vulgare)* floating in the air. This is a favorite plant with the goldfinch which enjoys its seeds and uses the down to line its nest. Then, too, the common milkweed *(Asclepias syriaca)*, which cradled and fed the larva of the monarch butterfly, has burst its pods and its silky threads are being air-borne to distant places.

Many species of birds are attracted to fruit-bearing plants; raspberry, blackberry, bayberry, sumac, holly, dogwood, Virginia creeper, elderberry, pokeberry, and viburnums are especially favored by a large number of different

kinds of birds. I find that it is well worth while for a bird watcher to know pokeberry *(Phytolacca americana)* which is found in the more rugged sections of the Garden, for is is reported that at least forty-nine species of birds eat the berries. Among these are the mourning dove, yellow-shafted flicker, kingbird, starling, cardinal, mockingbird, catbird, hermit thrush, gray-checked thrush, olive-backed thrush, robin, and eastern bluebird.

The main root of pokeberry is poisonous, and the berries also contain a toxic element for it has been noted that if a bird eats too many berries, it may become intoxicated.

On a lovely autumn morning I entered the woods in search of any animal which might be abroad. It was unusually quiet, and none could be seen, so I sat down on a boulder to wait awhile. Soon I heard the trip hammer sound of a woodpecker at work on a nearby tree. I focused my camera on the tree about ten feet away, hoping the bird would come into view. It did as shown by the accompanying illustration. This is a downy woodpecker *(Dendrocopus pubescens medianus*, average length six and a half inches), the smallest of the woodpecker family. It is a familiar species, easily identified by its black and white markings, especially the broad, white stripe down its back. The male has a red spot on its head. The downy woodpecker, an all-year resident at The New York Botanical Garden, lives mostly in open woodlands. In winter it is frequently seen in company with chickadees and nuthatches. This bird renders very valuable services to our trees by devouring quantities of wood borers and other insects, but it eats very little fruit.

One must be careful not to confuse the downy woodpecker with the hairy woodpecker *(Dendrocopus villosus)*. Both have similar markings, but the hairy is longer by about two and a half inches, his average length being nine inches, and his bill is heavier. This, too, is a year-round resident of the Garden but is not seen so often.

Other members of the woodpecker family may be seen in the Garden. From the middle of March until late in October there is usually the yellow-shafted flicker *(Colaptes auratus luteus)* and less frequently the yellow-bellied sapsucker *(Sphyrapicus varius)* and the red-headed woodpecker *(Melanerpes erythrocephalus)*. Bird watchers told me they had not seen the last species in the Garden for several years, but on the morning of May 28, 1963, two companions and I stood near the stone bridge and saw one among the tree tops.

Above.
Downy woodpecker, *Dendrocopus pubescens medianus.*

Right.
Woodpecker's "billwork" on a dead tree.

Baltimore oriole, *Icterus galbula.*

A tree in the southeastern corner of the Thompson Memorial Rock Garden, now part of the Native Plant Garden, has served as a "lunch counter" for members of the woodpecker family for a number of years. It is an excellent exhibit of the "billwork" of these birds, as well as factual evidence that they frequent the garden. I have seen the

Saw-whet owl, *Aegolius acadica.*

different species mentioned, with the exception of the red-headed, pecking on this tree. Many species of birds, and in considerable numbers, reside in the Garden at one time or another; but when they leave, there is no tell-tale evidence of their having been here. Not so with woodpeckers which always leave their calling card in the form of holes bored in trees.

As I stood one September morning on the bank of the Bronx River, scanning the trees on the opposite bank through my telephoto lens, a Baltimore oriole *(Icterus galbula)* suddenly flew out of the trees and across the river. He then perched on the lower limb of a tree some twenty feet from me. The Baltimore oriole is not a rare visitor to the Garden, neither does he come as often as observers would like. The male, a very showy bird, is easily identified by its brilliant coloring of orange and black and white wing bars. It winters in Central America, returning to the New York area about the middle of May and remaining until early September. This is a welcome visitor to the Garden because its diet consists of a number of insects, among which are spiders, ants, plant lice, and grasshoppers, with caterpillars perhaps the largest item. It does eat some cultivated fruit. Incidentally on another occasion, earlier in the year, I saw a Baltimore oriole enjoying the sweet juicy fruit of the black mulberry tree *(Morus nigra)* in the Herb Garden.

Long ago I learned not to be surprised at an unexpected meeting with unusual creatures or plants within the limits of The New York Botanical Garden. One of my most interesting experiences happened some time back when I was strolling through the woodlands late in September. I had previously seen a woodchuck *(Marmota monax),* sometimes called groundhog and marmot, scampering through the under brush and thought little about it, since these heavy-bodied, short-leg ground squirrels are very common. When driving along highways, one may see them moving away from the edge of the road as they hear an automobile approaching. Sometimes, unfortunately, they venture on to the highway and since they are unable to outrun a fast-moving vehicle, they meet an untimely end.

On this particular morning I came upon a woodchuck in the woods on the west bank of the Bronx River. For some reason I do not understand, I was able to advance within five feet before he became aware of my presence. When he did so, he moved very fast for such a chubby fellow, hurrying into the hollow center of a fallen tree.

Woodchucks average about twenty-four inches in length and weigh twelve or more pounds, so they are easily seen. But the chances are they will see and hear the human observer first and run to safety. With the approach of cold weather, October or early November, these animals retire to a deep burrow and hibernate until the following February or March.

The eastern gray squirrel *(Sciurus carolinensis)* is the best-known member of the rodent family and is prevalent throughout the Garden all year. It is a busy little mammal, raising a family—four to six are borne in each litter—and collecting nuts, some of which are stored in cavities in trees, others are buried in the ground. Fortunately they do not always remember where they bury the nuts, so they do much to distribute nut-bearing plants.

The black squirrel in the Garden is not a different species, only a color phase of the eastern gray squirrel. One or more may be borne to a litter. One black squirrel has been a resident of the Garden for several years. Perhaps because of its color and unusual friendliness, it is very popular with visitors. This squirrel is usually found in the Rock Garden or nearby area, waiting, it would seem, for some one to give him nuts. He will take all the nuts a donor offers and will go to extremes to get them, even climbing into a coat pocket.

Sparrows are prevalent, and usually in considerable num-

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Woodchuck or groundhog, *Marmota monax.*

SOME PLANT GALLS OF NEW YORK

By RICHARD B. FISCHER

Dr. Fischer is Associate Professor of Nature and Conservation Education at Cornell University, Ithaca, New York.

The following originally appeared in *The Conservationist*, February-March, 1964, published by the Conservation Department, State of New York, and is reprinted with permission of the editor of that publication and the author.

MANY A NEW YORKER has wondered, as he tramped his favorite wildlife haunts, if those odd-looking things on willows really were pine cones. And those brown, dried-up apples—did they actually grow on that oak? Maybe you have asked yourself, "What's that wad of moss on my rose bushes?"

Chances are you have seen one of the thousands of curious plant growths known as galls.

These peculiar swellings may occur anywhere on a plant —buds, leaves, flowers, twigs, under the bark, even the roots may be affected. They're caused by an impressive array of small organisms ranging from insects and mites to nematodes, fungi, and bacteria. And all have accomplished the same neat stunt—caused a swelling which provides food and protection from enemies and the weather. Furthermore, each gall maker produces its own distinctive gall and no other. Theirs is a truly amazing microcosm. But it is by no means a simple world. Nor is it foolproof. We'll take a closer look at their biology in the account of the species which follow.

Are they "bad?" Some are, seriously damaging plants such as apple, pear, cherry, spruce, roses, violets, even potatoes. Man has turned a few of them to his own use. The ancient Greeks used a gall as lamp fuel. Outdoor markets in the Near East sell them for food. (I doubt this tidbit would ever make the gourmet list here, since each gall would contain at least one crawling-type thing.) Because of their astringent properties, certain galls are used in medicines. In Arkansas farmers feed an oak gall to their animals. We could not grow Smyrna figs in the United States without the help of an imported gall-making wasp. Still, most galls are mainly biological curiosities.

This article deals with a few galls you can expect to find in New York during winter. Scientific names—those keys which unlock the sources of information about living things—are given for the gall makers. Let's take up the familiar ones first.

GOLDENROD BALL GALL
(Eurosta solidaginis)

Wherever the Canada goldenrod grows, you are likely to see the characteristic ball-like swellings which have attracted the attention of naturalists for more than a century. From New York and New England in the East to Oregon in the West to British Columbia in Canada, this gall is a conspicuous feature of the winter landscape. It's a splendid example of what biologists call host specificity: the fly that causes this gall attacks only the Canada species, even though many other kinds of goldenrod may live nearby.

Take a sharp penknife along on your next winter hike so you can cut one open. Make your cut parallel to the stem but off to one side. If the gall maker has not been parasitized, and if it has not been preyed upon (two pretty big "ifs," since that is what happens to nearly half of them) you'll find a quarter-inch long, cream-colored maggot in a little chamber inside. Hold him in your closed hand awhile and the beast will become active. With a bit of luck your blade will reveal one of nature's clever methods of caring for her brood. The fly that is going to emerge from that gall next May will lack teeth. So the larva (maggot) prepares an exit tunnel complete except for a thin cap of gall tissue. Using a balloon-like structure between its eyes, the transformed adult pushes off the cap and crawls out!

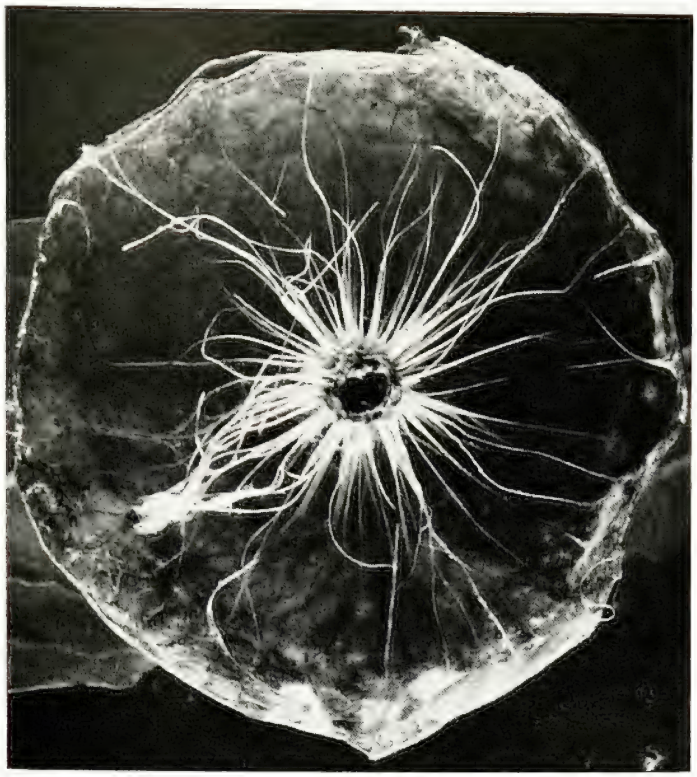
Should you delay investigations until late March, the larvae will have changed to pupae, and look something like grains of wheat. Why not take some unopened galls home? Put soil in a large-mouthed gallon jar, stick the stems into the soil, and cover with cheesecloth. Keep the soil slightly damp, and place the jar where it will not get direct sunlight nor heat from a radiator. If you collect galls in February, the adults ought to emerge sometime in late April. Don't be concerned about food for the flies—they don't eat. Their sole task in their few weeks of life is to reproduce the species.

After mating, the female, expert botanist that she is, seeks out young Canada goldenrods for her eggs. Cornell's Dr. Lowell D. Uhler, the American authority on this gall, informs us that she can infect as many as two hundred plants. This high reproductive potential enables the species to survive in spite of heavy parasitism and predation. The downy woodpecker is one of the birds which can locate the cap and the exit tunnel, dig it out, and devour the larva inside. Ice fishermen say that the maggot is good bait.

GOLDENROD BUNCH GALL
(Cecidomyia solidaginis)

This is also a widespread goldenrod gall, one which you will find on Canada goldenrod when looking for ball galls. In fact, it is possible to find both galls on the same plant. Caused by a different species of fly, this gall has been known for a hundred years, but surprisingly little is known about the maker. For instance, where are the adults in winter? We do know they emerge in early fall. We *think* the adult fly lays eggs only on Canada goldenrod, but it may be that she also attacks the red-stemmed and other goldenrods. Indeed, several thesis problems await the graduate student interested in doing research on this gall.

Although the bunch gall is also caused by a fly, its biology is nevertheless quite different from that of the ball-gall maker. Apparently the gnat-sized females lay eggs sometime in June since larvae are present in early July. Hers is a soft ovipositor, too weak to pierce the plant's tissues, so she merely deposits eggs in the growing tips of goldenrods. A gall does not begin to develop until an egg



The interior of an empty large oak apple gall.

hatches and the larva secretes a chemical substance which induces the plant's characteristic reaction. In addition, the maggot lacks jaws; instead, it is provided with a hardened "breast bone" with which it rasps away on the soft plant tissues inside the gall. This stimulates a flow of plant juice which the maggot "eats" by absorbing it through the skin! The gall is, in effect, a stem which has been prevented from elongating. Therefore, the leaves which would normally have appeared along the stem are crowded together into a bunch.

Goldenrod Scarred Gall
(Eucosma scudderiana)

The scarred gall is another of the goldenrod galls. Yes, this gall does resemble scarred tissue. According to some it occurs on a variety of goldenrods; however, I have seen it only on the Canada species.

If you cut open a scarred gall in winter, you should find a half-inch-long, light-colored caterpillar inside. A small hole at the lower end of the gall marks the place where the young caterpillar chewed its way into the stem and subsequently caused the gall to form around itself. During its stay inside the swelling stem, the larva sealed the opening with a tough, silky membrane. Moths, like flies, have no chewing apparatus; hence the caterpillar must arrange for getting out of the gall while still a larva.

About the first week in May this larva will transform into a pupa resembling a tiny mummy. Inside that pupal case occurs a mysterious biological process which has baffled scientists for centuries—the protoplasm of the caterpillar is completely rearranged to form a moth.

Take some of these galls home, too, keeping them as you did the ball galls. In a few months (no one seems to know the exact length of time) the adults will emerge. While only three-eighths of an inch long, they are truly handsome. But you must give up some sleep if you want to witness their emergence—they come out at night!

Goldenrod Elliptical Gall
(Gnorimoschema gallaesolidaginis)

While searching for scarred galls you might encounter a specimen which looks like an overgrown scarred gall, yet lacks the scarred tissue appearance.

Look for this gall on Canada goldenrod. However, do not expect to find it everywhere, since it has a spotty distribution—many in one area, practically none a mile away. Curiously, the moth that causes them emerges in the fall, mates, lays eggs on goldenrod plants, and then dies. When the eggs hatch the following spring, the caterpillars migrate to living goldenrods where each bores into the buds and tunnels its way down into the stem. Then the gall develops around the caterpillar.

Perhaps the most amazing thing about this gall is the plug in the exit hole. It is tapered like the "bung" in a beer barrel—and the hole, too, is tapered! Furthermore, it is translucent and the light passing through it to the interior of the gall guides the moth when it is ready to fly out of the gall.

Willow Pine Cone Gall
(Cecidomyia strobiloides)

Thirty-three years ago our family pitched a tent along the storied Beaver Kill at the State campsite. I never forgot the pine cones which grew on the streamside willows. Twenty years passed before I learned, in a field natural history course under the late Professor Eva L. Gordon at Cornell University, that they were structures called galls, and that a very small fly made them.

This gall maker is not especially particular about the host plant—any willow will do, provided it is not a weeping

Cedar apple galls on red-cedar.
Its life cycle will attack apples later.

willow nor a species foreign to the United States. Being a weak flyer, the gall maker does not attack trees whose lowest branches are more than fifteen feet above the ground. Her eggs, deposited in spring on the opening buds, hatch into maggots, secretions of which cause the typical pine cone swellings.

In autumn, the gall and a section of the stem just below it die. As the dead gall shrinks, its scales spread apart, and that is when parasites and predators gain entrance. Dead pine cone galls are a winter haven for all sorts of little creatures; midges, aphids, plant bugs, flea beetles, springtails, thrips, mites, spiders, even occasional centipedes.

Oak Apple Gall
(Amphibolips confluenta on *Quercus velutina)*
(Amphibolips inanis on *Q. borealis)*

Four centuries ago rural dwellers in Europe were using oak apples to predict the harvest. If the oak apples contained flies, they said, the year would be fruitful and fertile. These galls are probably familiar to more people around the world than any others.

New Yorkers have their share of them. Some are larger than ping pong balls, others smaller than a marble. Certain of them fall off in autumn, yet some remain attached for a year or more. A few are actually shed like fruits. I still remember the time I thought I'd found a crab-apple tree in my favorite squirrel woods, only to discover it was a scarlet oak dropping oak apples. On or off the tree, they certainly do look like apples, even to the beautiful reddish markings some bear when fresh.

How do you tell the different kinds apart? They tend to be host specific; but even when a person can identify all the oaks, it is still difficult. A large oak apple on a black oak is usually spongy inside. It is called simply the large oak apple. Attached to red oak you might find a big "apple" which is practically hollow inside and bears the ponderous name of larger empty oak apple. (Personally, I do not detect any size difference.)

The galls are really leaf deformations caused by wasp larvae. When the female wasp inserts her rasplike ovipositor into the leaf stem to lay an egg, she injects an irritant which initiates gall formation. Development of the larva with its attendant secretion continues the abnormal growth until there is a huge swelling—the apple—but scarcely any suggestion of the original leaf.

The arrow points to larva in a bisected goldenrod gall.

Cone galls on Norway spruce are caused by a species of aphid.

Oak Bullet Gall
(Disholcaspis quercus-globulus
on *Quercus alba)*

Entomologists calculate there are roughly two thousand species of gall-making organisms in the United States. Of these, approximately eight hundred belong to one family of wasps *(Cynipidae)*, the great majority of which produce galls on oak trees. And it turns out that one of the greatest students of these puzzling wasps was a scientist who, late in his career, turned from entomology to reporting on the behavior of his fellow men and women. His name: Alfred C. Kinsey.

Besides giving names to scores of new species, Dr. Kinsey helped us to understand their life cycles. For instance, the bullet galls on oak twigs represent only half their breeding cycle. The adults emerging from these hard, bullet-like swellings in fall are all females. Even though these females do not mate with a male, they are capable of laying eggs which will hatch and produce young. Scientists refer to them as agamic females. Where these agamic females deposit their eggs is a mystery. Suffice it to say, their offspring are males and females which behave normally and produce the conspicuous bullet galls.

New York's most common gall, the goldenrod ball gall and the fly that causes it.

Mossy Rose Gall
(Diplolepis rosae)

So far we have been considering conspicuous galls about which a good deal is known. The accounts of the remainder will be shorter, since they are either seen less often or there is still much to be learned about them.

The mossy rose gall is caused by a wasp—an exception to the general rule that wasps attack oaks. It came from Europe, probably in a shipment of rose plants, first appearing in Toronto in the late 1860's. Called the beduguar of the rose by European gardeners, it is a striking object when growing. It reminds me of a wad of red-tinged moss. I have seen this gall on wild pasture roses, and it is reported on a number of other species including those grown in gardens.

Hackberry Witches' Broom
(*Aceria snetsingeri,* a mite)
(*Sphaerotheca phytoptophyla,* a fungus)

Unless the average outdoors man sees the witches' brooms on hackberry, he finds it somewhat difficult to identify this tree. Plant scientists are not sure what causes the characteristic bunching of twigs and the attendant distortions. Currently they think the galls result from the combined actions of a mite and a powdery mildew. Further research is needed before we can be certain of what goes on.

Besides disfiguring the tree, the galls appear to prevent normal leaf growth and distribution of leaves on the affected twigs. I saw this gall frequently when I lived in the New York City area.

Sumac Flower Gall
(Eriophyes rhoinus)

This gall looks like a mass of brown, shriveled flowers—hence the name. Actually, the mite that causes this striking deformity attacks the leaves. Normally one thinks of a mite as an eight-legged creature related to the spiders. Oddly, this mite, along with the other gall-forming mites, is a four-legged creature.

A Chinese sumac gall, produced by an aphid, is so high in tannic acid that large quantities were formerly exported to the United States for the dyeing and tanning industries.

Ash Flower Gall
(Eriophyes fraxiniflora)

In this instance, the gall maker, a mite, infests the staminate flowers of the white ash; the "female" or pistillate flowers are borne on a separate ash tree. The flower catkins are irregularly distorted and, instead of dropping off after the flowering period, remain attached over the winter. While some say the galls disfigure the tree, I maintain they add a note of interest to the otherwise barren branches.

Poplar Vagabond Gall
(Mordwilkoja vagabunda)

"Reminds me of the double cockscomb plants in my garden," a friend remarked when I first showed him this gall. An aphid (plant louse) causes it by attacking a leaf bud in early spring. Instead of developing into normal leaves, the bud swells into a large, corrugated mass. It looks hard and woody; but squeeze the mass and you'll discover it is quite spongy and hollow inside. Developing galls are green in summer, turning dark brown by winter. Look for this one on aspens, poplars, or cottonwoods.

Raspberry Knot Gall
(Diastrophus turgidus)

Blackberries and raspberries are frequent targets for gall-making insects. The raspberry knot gall is caused by a wasp. If you collect one of these galls and keep it in a jar covered with cheesecloth, an amazing number of extremely small wasps will eventually come out.

The black knot gall frequently attacks the wild cherry, sometimes the sweet cherry and plum.

Locust Twig Gall
(Ecdytolopha inscitiana)

This gall is a swelling on the twigs and the young branches of black locust *(Robinia pseudoacacia)*. It does not occur everywhere in the State, but Long Islanders and those living in areas of glacial deposits are most likely to find it. A moth is the culprit.

Black Knot Gall
(Plowrightia morbosa)

So many persons ask me about this ugly-looking gall that I'd better include it in this article. The accompanying black and white illustration will help one to recognize it in the field. Does it recall the smut on corn? It should, since it, too, is caused by a fungus. Black knot is a bad actor as galls go, for its fungal threads penetrate the vascular system of the host and eventually kill it. Wild cherry is a frequent victim, though it may also attack sweet cherry and plum.

If you are looking for a retirement hobby, the subject of plant galls is guaranteed to keep you occupied. But to get started you'll need some reading matter. The classic reference is E. P. Felt's *Plant Galls and Gall Makers,* published in 1940 by the Comstock Publishing Company. Though the book is out of print, many libraries have copies and second-hand book dealers often advertise it. *The Cynipid Galls of Eastern United States* by L. H. Weld is another good reference. You can obtain a copy from Dr. Weld at 6613 North Washington Blvd., Arlington 13, Virginia, by sending him two dollars. From the Illinois State Museum at Springfield comes an illustrated, twenty-five-cent pamphlet by G. S. Winterringer, *Some Plant Galls of Illinois.* Should you prefer to begin still more modestly, a pocket-sized picture key, prepared by E. L. Palmer, is available from the Slingerland-Comstock Company, Ithaca, New York.

WILDLINGS AT THE GARDEN (Continued from page 178)

bers almost everywhere. Those who are interested in observing birds become so accustomed to sparrows that their presence is taken for granted. They comprise the largest bird family in the world. Over ninety species have been recorded in North America. I understand the number of individuals is so great that no one will venture to estimate the aggregate.

True sparrows are small- to medium-sized birds, with the majority having streaked plumage predominantly brown and gray. This makes them inconspicuous among foliage and on the ground. A particular characteristic is the short, stout, conical bill, well suited for crushing seeds which is their principal food. Because of their feeding habits, sparrows are one of the most useful tribes of native birds; they pass much of their time on the ground in grass and among weeds, consuming enormous quantities of seeds and some insects. Here, again, we recognize the skillful ingenuity of nature; sparrows help to control the spread of weeds by eating the seeds, and other birds, such as warblers, help to control insect pests by eating insects.

There is a superficial resemblance among most species which makes it difficult for the inexperienced observer to identify them. Some species, however, do have distinguishing characteristics. One in particular, which is to be seen in the Garden during migration, is the white-crowned sparrow *(Zonotrichia leucophrys,* average length seven inches). This bird arrives about the middle of May, lingers awhile, then proceeds to its breeding grounds in the North. On its way southward late in September or early in October, it may again spend a few days in the Garden.

The white-crowned is an aristocrat, considered by many to be the prettiest of all the sparrows. While it is fairly easy to identify the white-crowned sparrow, one must be careful not to confuse it with its white-throated relative, *Zonotrichia albicollis.* The two birds are quite similar in size and plumage, both having a striped black and white crown, but the white-throated, as its name implies, has a white throat.

There are more than three hundred kinds of owls, and they are widely distributed throughout the world. The sight of one in the city of New York is an exciting event, even though it is not unusual for owls to dwell in city parks and undeveloped areas where there are trees. Most of these creatures are nocturnal, sleeping during daylight hours, and perch high in trees where they are not readily seen.

Several species have been observed in The New York Botanical Garden, the one most appreciated being the tiny, and tame, saw-whet owl *(Aegolius acadica).* It is only eight inches long, two inches shorter than a robin. It usually visits the Garden during autumn and winter, and is active at night when it hunts food, consisting chiefly of mice and insects, occasionally small birds. During the day it rests quietly, generally well up in a tree and close to the trunk; it sometimes uses cavities or old woodpecker holes.

THE STRYBING ARBORETUM (Continued from page 169)

dens is to offer attractive and practical solutions to the many problems facing the home owner in the construction and maintenance of his garden. The Gardens will also become a showcase for new and interesting plants brought into this area by the Arboretum.

In the last five years great strides have been taken in the Arboretum, and the progress is largely due to the interest and support which have been received from the Strybing Arboretum Society. The membership of this Society, and in particular its Board of Directors, has contributed generously, not only in money, but also in knowledge and skill. The most outstanding result of their enthusiasm has been the In-Service Training Program for the grade-school teachers of the San Francisco school system. This is a series of lectures in nature interpretation which demonstrates how an arboretum can vitalize a science, social studies, and language-arts curriculum. One hundred teachers have participated in this course and over two thousand children have benefited from instruction given by Arboretum staff members. The course has been so successful that the school system has asked that it be continued until all the grade-school teachers have had a chance to participate.

In these and other ways, the Strybing Arboretum provides an opportunity for all who are interested to become familiar with the living plants which clothe our earth's surface and thereby gain an appreciation of their importance to our culture and economy.

Become Acquainted With
THE STATE BOTANICAL GARDEN OF NIKITA, U.S.S.R.

By VALENTINA BOGOLIUBOVA

Miss Bogoliubova is a technical assistant of Dendrology and Decorative Horticulture Department of the State Nikita Botanical Garden, Yalta, Crimea, U.S.S.R.

THE STATE BOTANICAL GARDEN OF NIKITA is one of the oldest scientific establishments of the Soviet Union in the fields of experimental botany and horticulture. It has extensive programs of original investigation and is entirely supported financially and encouraged by the government in carrying on its multisided activity.

Valentina Bogoliubova

The Garden is situated on the Crimean Peninsula, six kilometers (less than four miles) east of Yalta, almost in the center of a narrow coastal strip. This strip of land is entirely protected against invasion of cold northern winds by a range of mountains with an average elevation of four thousand feet, and is regarded as the northernmost outpost of the Mediterranean area. Days with frost vary from twenty-six to forty-two a year; the average air temperature of the year is approximately 12° Centigrade. On the hottest days the thermometer may go up to 35° C, while during the coldest months (that is, in January and February) the temperature may drop to seven or eleven degrees of frost. Fortunately, such low temperatures have only a momentary character.

Faced with lack of diversity in fruit trees and ornamental plants for southern Russia, the government decided to organize a universal arboretum in that part of the country. A prominent Russian botanist of that time, Christian Steven, a Swede by birth, was asked to make definite investigations on the prospects of and means for such an establishment. As a result of Steven's activity, and in accordance with his scheme, the Imperial Economo-Botanical Garden was founded in 1812. The ancient village of Nikita, a former Greek settlement established some four hundred years before, was chosen for the site.

In a short period of some twelve years the Garden exerted great influence not only in the Crimea, but in the southern part of the country generally. It provided those regions with cultivated fruit and grape varieties, and a quantity of young ornamental shrubs and forest trees were annually sent to many corners of the country. Soon a new and pressing problem launched itself—the problem of skilled gardeners. To meet this a horticultural school was founded for the training of those who sought scientific knowledge and practical experience.

The Botanical Garden of Nikita was the cradle for several modern scientific establishments: (1) Tobacco and Makhorka Experimental Station, (2) Zonal Station of Fruit Research, (3) Experimental Station for ether-bearing plants and drugs, and (4) Viticulture and Wine-making Research Institute of the USSR. Now these are independent and have research programs of their own.

Achievements in science and in agriculture at the Garden have resulted from the meticulous work of several generations of scientists. At present there are eight independent research departments and five laboratories in the Garden, with more than fifty scientific workers involved. We employ nearly a hundred technical workers and over four hundred labourers.

The breeding work of the Southern Fruit Department aimed at the development of new varieties less susceptible to frost and to chalk, and more resistant to summer heat and drought, has produced some excellent peach varieties as Krasnoschokiy (Red Cheeks), Pushisty Ranniy (Early Downy), Kremlevskiy (Kremlian), Russkiy (Russian), Sochniy (Juicy), Rot-Front, Tourist, and others. Pobeda (Victory) and Zemlianichnaya (Strawberry) plum varieties from crossings between local alycha (plum cherry) and Japanese plums have received general approval. Lastochka (Swallow), Crimean Black, Rusalka (Mermaid), Pobeda (Victory), and some other sweet cherry varieties have also proved very good in many respects. Twenty-four new fruit varieties became standard for the Crimea.

The scientists in another department—the Subtropical Fruit Crops—succeeded in developing some new almond varieties with very sweet and oily kernels coupled with a thin shell. These differ from introduced foreign almond varieties in having a much later blooming period which enables them to escape the late winter frosts. In this department they have also developed perfectly wonderful figs, much improved olive varieties, and good pomegranates.

High frost resistance of all the varieties mentioned has made it possible for them to be cultivated beyond the Cri-

A many-century old and weather-beaten oak, *Quercus pubescens*, in the Upper Section of the Nikita Botanical Garden. Its top has twice been broken by a hurricane.

A recent architectural addition, erected in the Upper Section, overlooks the Lower Section and Yalta Bay. It commemorates the one hundred and fiftieth anniversary of the institution.

mean Range, in the steppe zone characterized by cold and dryness. Many acres of new commercial orchards planted with the Garden's varieties were laid out during the last decade there, and at the present they are an important article of national economy in the Crimea.

The Entomology and Phytopathology Department of the Garden has come to the rescue when fruit and decorative plants are attacked by insects or diseases. The biology of most of these has been carefully studied; many kinds of pesticides, together with methods of application, were tested and brought into everyday practice. As a result, the percentage of injured apples, for instance, dropped from about sixty or eighty to only one or three, while the production of fruit of higher grade was doubled. Effective control methods against cherry fruit-fly have made it possible to harvest the crop without injury from this insect. The work of the department was highly appreciated and recognized by the government.

All other research departments and laboratories in the Garden take an equally active part in the plant investigation program. However, the Nikita Botanic Garden is first of all a botanical institution and the Flora and Vegetation Department is a leading one.

The staff of the department has long been involved in the investigation of the Crimean flora. Twenty-three hundred species of plants have been discovered on the territory of the Crimean Peninsula. More than two hundred of these are endemic Crimean species. A new species of a large-fruited hawthorn has recently been discovered and reported as yet unrecorded by botanists.

Another investigation of great interest is in the origin and development of the Crimean flora in connection with its genetical relationship to the floras of the Balkan Peninsula, Asia Minor, the Caucasian Black Sea Coast, and to the floras of more remote countries. Results obtained are very interesting.

One of the richest herbariums of our country is housed in this department. There are over one hundred thirty thousand dried reference specimens, representing not only the plants growing in the Garden but also plants of the Crimea as well as of many other countries.

The Department dispatches annually a great quantity of all kinds of seeds to the botanical gardens and horticultural institutions both at home and abroad through its Seed Laboratory.

The Arboretum of the Nikita Botanical Garden is a living museum of hardy woody plants collected from many corners of the world. There are four hundred and fifty representatives of the dendroflora of eastern Asia in the Arboretum. The Mediterranean area has given three hundred and thirty-six species. North America (its southern part) is represented by two hundred and thirty-eight of its native trees and shrubs. Some species came from South America, South Africa, and New Zealand. Only those species that grow immediately in the Tropics are not represented.

The Arboretum itself covers a little over seventy acres, while the total acreage of the Garden's property amounts to nearly a thousand acres. A belt of terraced experimental orchards, together with a Juniper Reserve of some three hundred acres, runs along the northern boundary of the Arboretum, while a Rose Collection of seventeen hundred garden varieties occupies the plot nearest to the sea.

There is also the Prairie Division of the Nikita Botanic Garden in Simpheropol region, Crimea, where all new and promising fruit and decorative plants undergo trial for their hardiness.

Our three nurseries, with their half a million young trees, annually bring an ample sum of money to our institution.

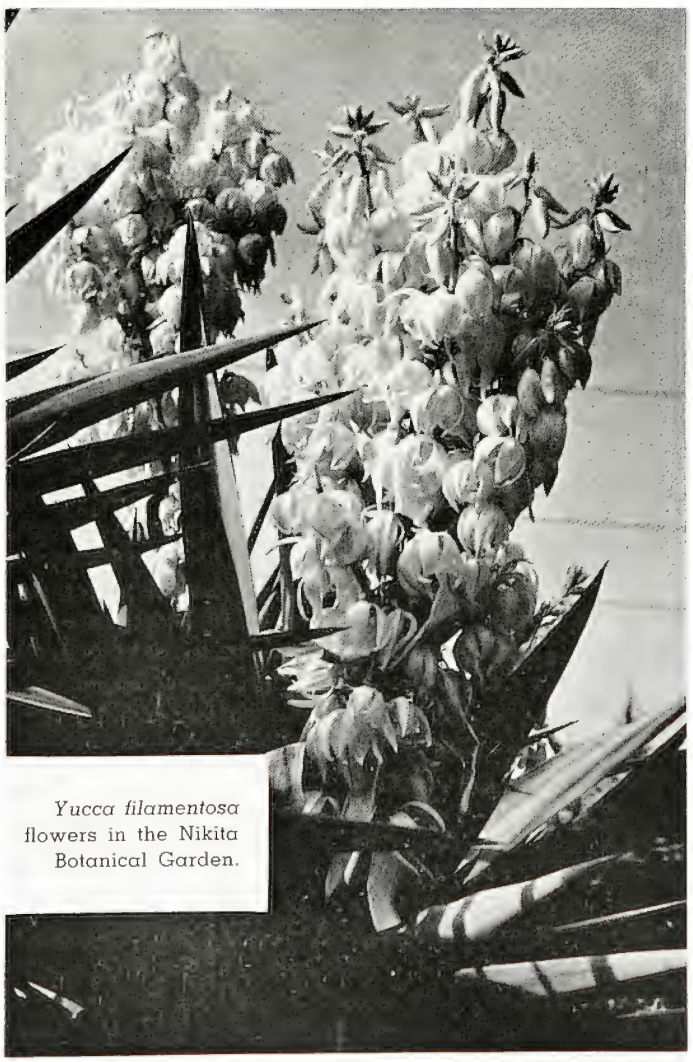
The State Botanical Garden of Nikita differs from most similar institutions in that the plants in its Arboretum are arranged not in botanico-systematic groups but in a landscape style. Many believe it is one of the most beautiful arboretums of the world. It is, indeed, a place to find enjoyment at any time of the year.

Trachycarpus fortunei Avenue in the Marine Section of the Nikita Botanical Garden.

By the end of March all deciduous trees and shrubs become suddenly green with the new foliage of spring, the leaves not yet fully unfolded, very pale, wrinkled, tender, and delicate. Long, yellow catkins of winter hazels, winter sweet, and alders are the first features of early spring; in succession, the dark red catkins of poplars follow. Almond, some prune, dogwood, and maple species, as well as Japanese quince and forsythias, burst into flower. Under the soft pushes of mild wind, tall, dark green, pyramidal cypresses may disappear suddenly behind a yellow curtain of dust; they are in flower, too, and myriads of pollen grains float in the air.

Carmine-coloured and fantastically curved young shoots of tree-peonies rise from beneath the ground as a promise of the charm to be enjoyed in May. February is a month of snowdrops, or rather "milk-drops." The flowers expand only on bright, sunny days; during dull or cool weather they remain closed, suggestive of a large drop of milk always ready to separate from its tall and slender stem. They are succeeded by French violets, unrivaled for the sweetness of their odour. A little later on, lovely masses of crocuses, daffodils, and hyacinths make their appearance and still later on, in May, tulips.

During the second half of May and in June it would be difficult to find a single plant without flowers. Large trees and low, spreading shrubs, conifers and herbs are equally attractive then. Lilacs, diervillas, pearl-bushes, and oleanders are like enormous bouquets; there are cascades of rambling roses and Chinese wisteria, snowlike masses of spiraeas; a palette of all imaginable colors—light and deep, bright and sparkling, or quiet and soft. And it is not only color to delight visitors; there are aromas, scents, odours sufficient to satisfy any liking.



Yucca filamentosa flowers in the Nikita Botanical Garden.

A cool and quiet atmosphere is provided by a mass of shining, as if wet, broad-leaved evergreens, by graceful and azure crowns of bamboo groves, by huge leaves of the Japanese banana, by water pools with lilies and gold fish in them, by the deep shade of conifers and the vast bowl of the nearby sea.

While from the end of April to the beginning of June the Garden is a riot of colours provided by all kinds of flowering shrubs and trees and flowers, the chief interest of the Garden in October and onward is a riot of autumn colours of foliage and berries of many deciduous woody plants. Berries are everywhere—black, blue, white, yellow, orange, red, carmine, coral, violet, silver, and bronze, in many different shapes, forms, and dimensions. Most of them last all winter, catching the eye and attracting a host of birds.

On some winter days the Garden is suddenly transformed into a fairyland when all its greenery is covered with deep snow or with a thick layer of hoar-frost, thousands of jewels glittering in the low morning sun. Then it is a sight to gladden any human heart, but . . .

> . . . "the sun arose,
> And with a fiery touch,
> Gilded each frond,
> Then wiped it out
> As nothing very much."

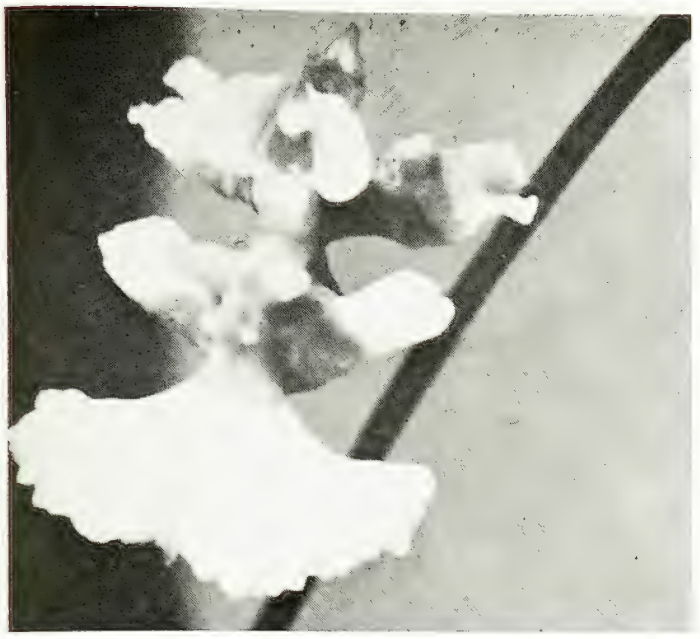
TWO BAHAMIAN EQUITANT ONCIDIUMS

Part II—*Oncidium bahamense*

By LINCOLN ADDERLEY

Mr. Adderley, a gardener, takes care of the orchid collection at The New York Botanical Garden.

AFTER MY TRIP TO THE ABACOS in 1962 in search of *Oncidium lucayanum,* I asked my friend John Patterson if he would be on the alert for *Oncidium bahamense* since I should like to cultivate it. Mr. Patterson, who is interested in the flora of the Bahamas in general, must have spread the word among the people who live in the general vicinity where the plant was originally collected and there must have been an awakening of interest, for later in 1962 I received a letter from the Department of Agriculture in Miami, Florida, saying that there was a box of plants there for me from the Bahamas. I became concerned, for I thought the plants would suffer while waiting such a long time, and rushed a letter to Miami. Things moved quickly from then on. In about a week the parcel arrived at The New York Botanical Garden. I immediately ripped it apart. (I am sure many of you orchid enthusiasts will appreciate this moment of excitement!) The plants were somewhat



Oncidium bahamense.

dried out; but after a good soaking in a mild sugar solution, they looked better.

Up to this point I had not had an opportunity to study *Oncidium bahamense* in the field, but there was some ecological information accompanying the plants. However, since I never like to "put all my eggs in one basket," I decided to pot one group in a shallow pot of osmunda and another on tree-fern slabs.

Oncidium bahamense is listed in *Bahama Flora* as having been collected originally on the island of Andros, the largest island in the Bahama group. It had been lost to cultivation for many years—perhaps no one was sufficiently interested to go in search of it.

Now that *Oncidium bahamense* had been relocated, I naturally wanted to see it in its native habitat. While enjoying a holiday in the Bahamas in 1963, I was again fortunate in going out on another jaunt—this time in search of *Oncidium bahamense* and to study *Epidendrum plicatum* in full flower in the field.

My friend Stanley Smith made preparations for a short expedition to the island of Andros, and quite early in the morning of a lovely June day we took off once again in his beautiful boat. Andros is only about seventy-five miles northwest of New Providence, the capital of the Bahamas. After cruising four to five hours we crossed the second largest barrier reef in the world—here one appreciates a Bahamian captain who knows not only every channel in the reef but also can determine the depth of water to an inch, so it seems—and docked at Fresh-Creek, a relatively new tourist resort.

Since I had been in the bush at Andros while on my 1962 trip, I knew exactly where to find *Epidendrum plicatum.* As soon as we docked, we hopped on bicycles, which we had brought with us, and peddled along the outskirts of the resort. We were armed with machettes and mosquito repellent, for the captain had heard, in Nassau, about the recent heavy rains and the new mosquito hatch. No one, however, told him about the land crabs. These belong to the *Crustacea* and have pincers three times the size of lobsters. They are really harmless, unless one decides to catch them by hand or inadvertently walks on them. Usually the crabs, which bury themselves in the ground for the winter, and mosquitos arrive at the same time, for the crabs feed mostly on the tender herbaceous growth brought on by the rains.

In a little while we were in *Epidendrum plicatum* country and could spot plants here and there along the road. Parking our bicycles in the bush, we took off along track-roads made by tractors a year or so ago while cutting property lines. These roads, though partly overgrown, facilitated matters considerably for the Bahamian scrub, as it is called there, with its briars and hall-back *(Pisonia aculeata)* can be more difficult to penetrate than the South American jungle. The scrub-area in which most of the orchids grow is just over man's height and one literally has to wade through it, whereas in the jungles of South America one can walk beneath it with relative ease. Along these roads, running in all directions and covering a considerable area, we saw hundreds of the beautiful *Epidendrum plicatum* in flower, We selected different color forms ranging from purple through clear yellow with just a blotch of purple on the lip. It is exciting enough collecting orchids, but it is fascinating to collect and study a group of plants or a particular species in the field in full flower.

Epidendrum plicatum grows in the open scrub-area mostly at the base of small trees or shrubs where some of the roots reach into the semidecayed leafmold on the ground. It is a rugged plant and will tolerate almost full sun—indeed, needs sun to flower well. The flowering period in the wild is mid-May through July, coinciding with the beginning of the rainy season.

We spent the morning in collecting armsful of *Epidendrum plicatum* and depositing them at various points along the road to be picked up the following day. When we felt that a good-morning work had been done, we returned to the boat for lunch and a short rest.

Early in the afternoon we were off on our bicycles again, this time in search of little *Oncidium bahamense,* farther out in the woods in the pine barrens. Stanley Smith had received pretty good reports of the area where it had been previously found; so when we reached the pine barrens, we left our bicycles and took off on foot, searching around every individual tree or clump of *Pinus caribea.* We looked for a long while before I finally sighted *O. bahamense.* After the first discovery I realized that I probably had passed many, for this orchid is semiterrestrial and grows partly covered by the long needles of the pine. The little plant with its relatively long internodes stretches upward in order to stay on top of the annual needle fall of the pines. This is an amazing ecological arrangement and quite interesting, for this oncidium is not found anywhere else except under this species of pine. When a plant, or group of plants is pulled up, one gets the impression that the plants were potted in tree-fern fibre.

While we were collecting *O. bahamense,* I was fortunate in seeing the germinating seeds—in the protocorm stage. The seeds are deposited from the previous year's pods and lie dormant for a few months. During this dormant period new needles are deposited on the seeds which not only protect them during germination from strong light but also

help to collect dew and conserve moisture for the tender seedlings. The wonders of nature!

Oncidium bahamense, growing on the periphery of the pine trees, gets considerable shade during the hottest part of the day but good morning and afternoon light.

We collected a goodly number of plants, taking care to leave some in each area. Since the plants are quite small, we were able to put them into the baskets on our bicycles and take them directly to the boat. As we rode toward the coast, great black clouds were releasing rain not too far ahead of us, but they moved slowly away, sparing us from a drenching.

The following morning we started at five o'clock, just as the sun was climbing over the horizon—what a beautiful sight this is in the Bahamas on a calm day—for more collecting and to prepare and gather together the epidendrums to be picked up. When all our plants were ready, I headed into town for a promised car, only to learn that the car had been loaned to another party the night before and something had happened. No car! What do we do? I peddled around town on my bicycle, looking for the manager to see if he would loan me a truck. He was not at the office. I was told that I might find him at home, a mile or two down the road, In the Bahamas around the corner usually means a few miles. But as we had to get our plants out of the bush, I peddled down the road; fortunately not too far, and I found the manager at home. While he had only one truck in operating condition, he said he would let me have it for a short while. I rode into town with him, then headed the truck for the bush. By this time I was more concerned about Stanley than the orchids, for it was late in the morning and we had not eaten breakfast. I had visions of finding him under a tree, suffering from thirst and exhausted from fending off mosquitos. But it takes more than thirst, hunger, and pests to discourage a real orchid hunter! We proceeded to load our plants on the truck, being thankful that we had a truck for we could never have fitted all into a car, and drove to the boat with a feeling of great satisfaction. Stanley was delighted to have a fine selection of *Epidendrum plicatum* for his garden, and I was happy at finally finding *Oncidium bahamense* in the wild.

On the boat the plants were hosed down thoroughly and wrapped in a white tarpaulin to keep them cool and to protect them from the salt spray on the homeward trip. Then we headed for the great Andros reef and some fishing before setting course for New Providence. I like to fish, and this is one of the pleasures of plant collecting in the Bahamas. When one has trampled the bush enough, he can always turn to the sea for relaxation—fishing, swimming, or skin diving. I find swimming around a coral reef a great form of relaxation, and I have yet to find a more perfect natural garden.

Oncidium bahamense is a miniature equitant with almost terete leaves from two to three and a half inches long. They are channeled on the upper side with finely serrated margins, and have a few purple spots scattered over the entire leaf, becoming heavier on the upper channeled surface. The internodes are from two and a half to three and a half inches. The slender spikes are from twelve to twenty-four inches tall and carry twelve to eighteen well-spaced flowers.

Stanley Smith, in the bush on Andros, holds *Epidendrum plicatum* in his hand. A plant of this orchid, at left, is in flower.

Individual flowers, one half-inch across, are carried on three-quarter-inch pedicels subtended by an ovate, acute, greenish brown bract which becomes grayish white with age.

The sepals and petals are white apically, with brown on a greenish yellow background basally. The lateral sepals are connate for almost the entire length, while the dorsal sepal forms a hood which arches over the column and protects the anther from falling objects.

The white reniform lip is one half-inch across with the lateral lobes pointing backward. The crest and the area immediately around are light brown with six yellow calluses, three more prominent than the others. There is an area of light pink along the midvein on the under side of the lip.

The column is light brown apically and green basally, with light pink column wings pointing upward and almost enclosing the stigma.

In the wild the plant flowers from mid-April through May. Here in the greenhouse at The New York Botanical Garden, the flowering is delayed somewhat and continues through June. This is probably due to the low light intensity which the plants receive here in the North during the winter months. Unlike *Oncidium lucayanum, O. bahamense* varies little in color. There is some variation in size of spikes and flowers, but this is due only to the size and condition of the plants.

We can't deny it any longer; it is autumn. You will recognize it in the flowering of the autumnal chrysanthemums . . these autumnal flowers bloom with special vigor and fullness . . this flowering of mature age is more vigorous and passionate than the restless and passing tossings of the young spring . . . What is a falling leaf to this rich autumnal display? Or don't you see that there is no exhaustion?

KARET CAPEK in *The Gardener's Year*

IN RETROSPECT - ORCHIDS AS HOUSE PLANTS

By H. Phillips Jesup

Mr. Jesup is a member of the American Orchid Society, the North Jersey Orchid Society, the Connecticut Orchid Society, and member and Vice-President of the Greater New York Orchid Society. A banker by vocation, Mr. Jesup describes himself "as a frustrated botanist, conservationist, ecologist—without formal training in these disciplines. Horticulture is a major interest, natural history in all its phases intriguing."

BEGINNING ABOUT TEN YEARS AGO and continuing at an accelerating pace, there has been an influx of "come hither" advertisements and "it *can* be done" articles in gardening magazines and Sunday supplements, as the trade, ranging from horticultural hucksters to established orchid nurseries, sought to capitalize on what was a revolutionary discovery in the modern United States—that the exotic and romantic untouchable, the orchid, was just another monocotyledonous plant, specialized and highly developed in the evolutionary sense, it is true, but requiring the basic elixir of light, air, nutrients, and moisture needed by "ordinary" higher plants. It was therefore portrayed as a realistic subject for the average house-plant enthusiast equipped only with the average windowsill. This, incidentally, had long since been discovered by the Dutch and the Germans and probably others who many years ago had reputedly grown with great success *Paphiopedlium insigne,* odontoglossums, and other orchids requiring cool temperatures in windows near which night temperatures in winter approached freezing when the fires were low.

I have the impression that the commercial interests and even some of their customers, starry-eyed with the excitement of a few early comparative successes, write their "join me" articles or copy only half believing that it can be done. As a veteran of twelve years of orchid growing on a sunporch as well as dining room, living room, and kitchen windowsills, I feel that I can in good conscience allay the hesitancy of the skeptics, who with some logic are wary of flashy claims and suppose that orchids could perhaps be rebloomed once or possibly twice before improper conditions debilitate the plants past the point of flowering.

I began not as a victim of advertising nor as the recipient of a gift plant, but as a seventeen-year-old, natural-history-oriented vacationer in Jamaica, West Indies, fascinated by the contrast of tropical plants to their temperate relatives. Without having previously had a particular leaning toward the *Orchidaceae,* I nevertheless became so intrigued by the weirdness and strange beauty of the native species, as well as by the extraordinary concept of such glamorous plants perching as epiphytes or lithophytes on trees or rocks, that I spent much of my vacation collecting specimens. Naively unaware of the necessary United States Department of Agriculture plant-importation restrictions, I cheerfully packed my booty in a suitcase and breezed through customs at New York without discovery. (Of course, I should have had a readily obtainable permit from the Department's Hoboken, New Jersey, office, which results in the application of hygienic measures to the plants at port of entry.)

Starting from scratch as far as knowledge of proper orchid culture was concerned, I devoured what few books I could unearth in our town library and had some brief success, which was soon reversed by lack of attention induced by college, girls, and the other absorbing pursuits of that phase of my life. The upshot, some four years later, was a single living plant of the original group of seven species—*Epidendrum cochleatum,* the clamshell orchid, whose survi-

The south window of the author's sunporch.

val is testimony to its ability to take neglect and punishment which would tax a philodendron. Increasing interest naturally led to increasing knowledge, gained through reading, visiting orchid nurseries, joining the American Orchid Society as well as the Greater New York Orchid Society, a local affiliate, and cementing scraps of knowledge with observation, an indispensable agent.

From this it may be seen that I had become a "hobbyist"; few people who grow an orchid can do it casually for long, and I was as vulnerable as any. My collection now numbers about seventy plants grown without benefit of a greenhouse (or as the fraternity of "windowsillers" likes to put it, with tongue somewhat in cheek, "unencumbered by a greenhouse"). Largely for the sake of experiment, I do not practice what I preach by confining myself to types with similar cultural requirements which coincide with the conditions available; the plants run the gamut from the standard sun-loving cattleya types to cold-growing odontoglossums, warm-growing and shade-requiring phalaenopsis and stanhopeas, and numerous miniature species or "botanical" orchids and their hybrids whose star is belatedly in the ascendency among orchid enthusiasts. There have been a few failures, an encouraging number of outstanding and continued triumphs, and many only slightly qualified successes. A number of plants have performed more than satisfactorily over a period of six or seven years with no decline in vigor.

The majority of my plants are housed from mid-September to early June on a heated, furnished sunporch in Connecticut, in front of three large picture windows facing east and south respectively. The day temperature ranges from around a maximum of 78° F during sunny early spring and autumn days down to a maximum of 63° F on overcast cold days in midwinter, while the important night temperature varies from about 65° under the former conditions to around 53° near the glass on cold winter nights. The relative humidity is about fifty to sixty percent, as measured by an inexpensive hygrometer, during the short period in spring and autumn when the furnace is not in operation, but it drops to a fairly consistent thirty to forty percent during the winter. The pots rest on wood slats in turn lying on coarse gravel in four-inch-deep copper trays, the water level being below the bottom of the pots so as not to obstruct rapid drainage. The gravel is kept nearly covered with water from

The slatted bench on which the author's collection spends the summer.

Phalaenopsis schilleriana, after six years on the windowsill of the author's dining room. Note gravel and wood slats in copper tray.

the run-off through the porous potting materials as the plants are watered; watering takes place about every three days from November through April, when the heat is on, for pots to four inches in diameter, and about once every six days for larger pots. The frequency of watering is about halved when the furnace is not running and, of course, varies somewhat with the species of orchid involved as well as the stage of growth or rest period of the plant. The collection is occasionally squirted with mist from an atomizer-type sprayer on sunny days, but not with any regularity primarily because of lassitude on the part of the grower. Fertilizing of those plants in active vegetative growth is accomplished by applying very dilute solutions of "Atlas Fish Emulsion," alternated with an equally dilute 30-10-10 concoction, for plants potted in fir bark about once a month, and perhaps slightly oftener as the sun becomes stronger in early spring.

For reasons of ease of care, overcrowding on the porch, and to avoid the problem of the shading of the large south window by trees, the majority of the plants are lugged outdoors to reside during the summer on a slatted bench placed under a thinly leaved flowering crab-apple and extending somewhat beyond the periphery of the branches. This set-up results in dappled shade at the interior of the bench and nearly full sun at the edges, except during the few hours when the sun is nearest its zenith. Plants are positioned according to their light requirements, with brassavolas, cattleyas, the one cymbidium, laelias, oncidiums, *Dendrobium kingianum.* and so forth in the most sun; paphiopedilums, phalaenopsis, pleurothallis, masdevallias, dichaeas, and others in the shadiest part; and the balance in between.

The plants in fir bark are fertilized weekly when outdoors, and are drenched nearly every day with the hose, depending on the weather. In addition, they are usually misted around noon on hot days. As a precautionary measure a malathion spray is applied roughly once a month, as is a methaldehyde drench for those voracious root amputators, slugs and snails. Almost without exception the plants have responded hand-

somely to this summer vacation by producing strong flowering growths and bloom sheaths, although the few plants I keep on the porch all year do correspondingly well. I intentionally select for the collection species or hybrids which habitually make their vegetative growth during the summer, when conditions are least harsh for windowsill orchids, for I have found that most of those on the opposite schedule have trouble. My one real exception to this rule is *Oncidium* Java, a primary hybrid, which unfailingly produces each summer its great panicles of brilliant yellow, one-and-a-half-inch flowers, consisting largely of labellums, on stocky growths produced in the winter.

Orchids are tough plants, their generally low rate of metabolism resulting in slow death under abuse as well as slow growth under the best of conditions. Orchids seem able to adjust to less than optimum conditions, although in some cases a year or two will elapse before they begin producing robust growths and flowers. If one environmental factor must necessarily be substandard, the plant will usually perform reasonably well if the other factors are in balance. This is particularly true of humidity, which for many types of orchids is not the crucial factor it is generally believed to be. While relative humidity in a greenhouse is readily maintained at a desirable sixty to seventy percent by automatic humidifiers, damping down, or misting, it is a struggle in most homes in the winter to boost it much over thirty percent, an unhealthy figure for plant or human. I personally do not espouse the use of Wardian cases except for those few dense rain-forest indigenes such as the Pleurothallid group, for the lack of air circulation can cause potting media and leaves to remain wet too long after watering, thereby encouraging root-rot and bacterial leaf-spot diseases. The problem is probably best handled by setting the plants on trays of wet gravel, misting the leaves on bright days with a few squirts from an atomizer, locating the plants on kitchen or bathroom windowsills where hot water can occasionally be turned on for a few minutes to create steam, or drawing a plastic curtain across the window in front of the plants on sunny days after misting. All these ideas help to raise humidity somewhat; but with proper attention to other cultural factors, many species do all right without any special tricks to fight atmospheric dryness.

Orchids in the home will also need more frequent watering than those in the greenhouse. Some neophytes tend to overcompensate by underwatering because the hazards of overwatering, which are real, have been too thoroughly drummed into them. With the pseudobulbous orchids, the old rule of a soaking just as the potting medium becomes almost completely dry still holds—it will just become dry faster in the house. When to water becomes as much intuition as anything. Here the grower with a windowsill and his necessarily small collection may be at an advantage over his neighbor with a greenhouse, in that he is better able and more apt to cater to each plant's moisture requirements and needs in general, dependent on the variables of stage of growth, species, pot size, age and nature of potting medium, and how well the plant is established in its pot.

On this last point it is most advisable, at least at the start, to purchase well-established plants, whether by personal selection at an orchid range or through the mail to be shipped *in pot*. The chances of success are dimmed, if an orchid must contend with the shock of being repotted, with inevitable root breakage, at the same time that it is subjected to sudden environmental change. While I have had some success in establishing newly collected plants on the sun porch, it is taking a chance, and the recovery is much slower than in the more hospitable climate of a well-managed greenhouse. It is also wise to start with mature plants. The unfortunate myth that orchids bloom only every seven years does have some basis in that it is a misinterpretation of the fact that most species require an average of about seven years from seed to maturity. This is enough to tax the patience of the most enthusiastic beginner, and most importantly, the seedlings demand a more humid and hospitable environment in order to thrive and forge ahead properly.

When confronted with repotting, never an easy job, the home grower must forget one of the time-tested rules—that of never proceeding until the plant is beginning to show signs of new root action. I learned the hard way when I repotted a handsome white bifoliate cattleya, *C.* 'Louise Georgiana', in the dead of winter, the rhizomes having "walked" over the edge of the pot as of the last growing period and

Sophronitis coccinea, a brilliant red, dwarf, high-elevation Brazilian species, took several years to become acclimated to the point of blooming.

In eight years on the sunporch, this mohagony-red, primary hybrid *Paphiopedilum 'Harrissianum'* has never failed to flower twice a year.

Laeliocattleya 'Blanche', a small-flowered, cream-white hybrid, bloomed for the second time in the summer of 1963.

the emerald new root tips having appeared. The plant, dessicated almost to the point of expiration by the time the artificial heat went off in late spring, took two years to regain its former vigor. I now find it better to confine all repotting, regardless of growth cycle, to early June when the plant will have the summer's humidity to help it through the shock. Incidentally, all standard potting media seem acceptable under home conditions, including, for epiphytes, fir bark, osmunda, and chopped tree-fern fiber. It is best not to grow plants attached to logs or bare tree-fern slabs unless one is willing to dunk them once or twice a day.

Another area of contrast to conventional culture is the necessity for making the most of limited space by juggling the plants to gain maximum advantage for each. As a general rule, I try to position shade lovers behind sun worshippers, and plants in vegetative growth or resting just before bud formation in the most favorable spots. Those which are naturally quiescent for long periods after blooming are given comparatively short shrift in the placing. I also orient all pots so that the growing end of the plant or the most recently completed growth is faced toward the window to obtain maximum light. The result of phototropism is counteracted after growths have matured by careful staking and tying. The greenhouse orchidist need not be concerned, for his light comes from above. His problem is often too much rather than too little.

Temperatures can be a problem. It is quite important that there be at least a ten-degree drop in night temperature, which is not always easily achieved in the home. While the furnace is usually turned down at night, aids in the form of a curtain to draw in the evening between the room and the plants, or just a storm window left off, may be required. Although as I mentioned earlier I do not follow my own advice, it makes sense, unless one is prone to experiment, to confine his selection to species originally from a montane habitat, with a night temperature requirement of 50°-55°; to the so-called intermediate group in the 58°-62° range; or to those indigenous to tropical lowlands, preferring a night temperature of about 63°-68°.

Despite specializations adapting many orchids to an epiphytic existence, the cultural requirements of most are not

Dendrobium kingianum, a dwarf Australian lithophyte, makes an attractive and responsive house plant.

difficult to meet in the average home. Orchids may well be considered as satisfactory house plants, if the grower can assimilate a basic understanding of the plants' needs and apply it conscientiously. The moderate challenge involved only makes the blooming that much more appreciated.

THE LIZARD'S TAIL (Continued from page 173)

westward from the Atlantic States. The Asiatic species, *S. loureiri,* is found from north China and Japan south to the Philippines.

The wood duck *(Aix sponsa),* which frequents open waters, marshlands, and banks of wood streams as well as ponds, is believed to be the primary means of this plant's distribution throughout the United States. The bird feeds on the seeds of the plants and thereby carries them from one body of water to another.

A few plants along the shallow areas of any lily pool make worth-while additions and can stand a wide range of water temperatures from that of shallow ponds to the cold waters of spring-fed pools. Since they are hardy, they never need to be protected from the cold and are really easy to control in a small pool. Propagation is simply by division of the root-stocks.

USES OF VARIEGATION (Continued from page 175)

Not only are there variegated plants for use out of doors, but there are many variegated forms of house plants which will brighten indoor gardens and furnish contrasts of light against dark backgrounds. The striking variegated ivies enliven the greenhouse or indoor window garden. Some, such as var. 'Gold Heart', have yellow in their leaves, while others have leaves streaked with gray and white.

Variegation in plants sometime indicates a virus disease or an absence of chlorophyll—this is true of the foliage of *Camellia japonica.* Nevertheless, the variegation of the plants described in the foregoing paragraphs can be used to great advantage in creating unusual garden pictures.

CONVERSATIONS ON ECOLOGY XII

Dr. Thomas H. Jukes at one time collaborated with The New York Botanical Garden's former Director, Dr. William J. Robbins. A prominent nutritionist, he has been on the forefront of research in his field. From 1942 to 1964 he was Director of the Nutrition and Physiology Research Section of Lederle Laboratories (American Cyanamid Company). Dr. Jukes recently moved to the Space Science Laboratory of the University of California at Berkeley. Drawing upon his knowledge of applied science and of industry's contribution to human welfare, he has taken an active part in the debate that was launched by the late Rachel Carson's *Silent Spring*.

UNIVERSITY OF CALIFORNIA
Space Sciences Laboratory
Berkeley, California

Dr. Pierre Dansereau
The New York Botanical Garden

June 1, 1964

Dear Dr. Dansereau:

In response to your kind invitation, I first address myself to your letter "Conversations on Ecology," in *The Garden Journal,* Vol. 13, page 184 (1963), and especially to your quotation from Edmund Burke; "Those who would carry on great public schemes must be proof against the worst fatiguing delays, the most mortifying disappointments, the most shocking insults, and, worst of all, the presumptuous judgment of the ignorant upon their designs." Herein lies the basis of the current controversy regarding pesticides. Those of us who have been concerned with their discovery, evaluation, production, and use have cast ourselves in the role of carriers-out of such public schemes. Ours is the fight against vermin and parasites, against hunger and disease. It is we who receive the public insults; in the *Sierra Club Bulletin* we were recently characterized as "The hired practitioners of mendacity." Against the fearful, the uninformed, the reactionary, and the vituperative we struggle, only to find that our opponents have stated that they, rather than we, are entitled to the assumption of heroic postures, and that they represent themselves as the only unsuborned dispensers of authentic knowledge.

By your fruits ye shall know them. The majority of people undoubtedly deplore the population explosion, but rare is the individual who seeks to alleviate it by the only socially acceptable method, that of removing himself from the contemporary scene. It is true that all of us at times are irritated with the technical web in which we are trapped. To quote Simpson[1], "It has long been an open secret that the advances of technology can be a mixed blessing. The Greeks had a legend for it. Still earlier, there was doubtless an outburst of australopithecine invective when it was discovered that fire burns as well as warms." But it is a matter of record that, with the exception of Prospero's farewell address in *The Tempest,* mankind has not abjured the fruits of the knowledge of good and evil. Those who vociferously protest the despoiling of our countryside do not give up their automobiles, their use of wood and paper products, or their hearty consumption of the food which comes from modern farming. The problem of discontent is compounded by the scientific methods which bring us knowledge of facts which were formerly hidden from view. It is only sixty or seventy years since radioactivity and its harmful effects were discovered. Yet the scintillation counter now tells us that since the beginning of organized life, all cells have contained radioactive carbon and potassium in small traces. As the resources of vapor-phase chromatography, mouse tests, spectrophotometry, neutron activation, and microanalysis are deployed on ourselves and our surroundings, the horror mounts. The brilliant flowers of a morning glory *(Ipomoea tricolor)* are said to be the harbingers of a hallucinatory drug[2]; we have just learned that the friendly Mr. Peanut is apt to contain aflotoxin, an injurious substance picked up from molds in the soil, that produces "milk toxin" in the milk of cows fed peanut meal[3]. The cholesterol that is present in every animal cell can be shown to produce experimental cancer[4]. Most damnable of all because they are synthetic, detectable, and new, chlorinated hydrocarbons have invaded every nook and cranny. We are told that they are in the eggs of the few bald eagles which have survived the gunfire which blasted most of this species from the skies of Alaska as a result of the bounty placed on carcasses of the national emblem by the Territory that became our largest State. It would be indeed surprising if most chemical substances, including recently-introduced ones, could *not* be shown by delicate testing procedures to be widely distributed. One pound of a chlorinated hydrocarbon can furnish one billion molecules to every square foot of the United States if spread uniformly. If we are to be increasingly informed of the chemical composition of our environment, we must learn to recognize the difference between a toxic dose and a tolerable dose. The opponents of fluoridation seldom mention that fluoride is an essential component of the enamel of their own teeth. One of the most startling illustrations of toxicology was recently provided by George McNew[5], who pointed out that adenosine triphosphate (ATP), a central substance in the functioning of all cells, with a key role in the process of photosynthesis in plants, is utilized so rapidly that an active boy may produce and consume *his own weight* of ATP in twenty-four hours; yet ATP when injected can cause death.

In the series of letters in "Conversation on Ecology" and in other similar articles, certain opinions are expressed which I shall take the liberty, in some cases, of summarizing, or of oversimplifying, as follows:

(1) "There are too many people, especially new arrivals, they are cluttering up the landscape and they are spoiling everything." I suppose all of us feel this way at times, but I can't help noticing that vigorous conservationists often produce splendid families of four or more children. It seems certain that we shall continue to do medical and pharmaceutical research to preserve the life of every human being who can be helped, and that we shall make every effort to provide the food, clothing, and shelter which

people need, hoping at the same time that some means and desire will emerge to limit voluntarily the rate of increase of population. There is criticism that agricultural production is too intensive, but against this must be weighed the consideration that natural areas of parks and wilderness may fall under the plow if the farmlands do not supply sufficient yields of food. I can remember World War I in England when virgin turf in the estates of the wealthy was broken to plant potatoes.

All of these arguments may well be in vain; the human race may be in the logarithmic slope of the growth curve, plunging ahead to destruction in a concrete and stainless-steel charnel house, but if we hope to check this onrush over the Gadarene precipice, we must at least talk to each other without continual recriminations.

(2) "Those who are concerned with the production and use of pesticides are inherently suspect because chemicals are produced for profit. Any statements that these people make are sales propaganda." Such an attitude shuts off debate and draws battle lines. It is easy to shout in return that professional conservationists solve their fund-raising problems by making up sensational stories about the destruction of robins. If we don't like capitalism with all its advertising and free-wheeling competition, let's take a look behind the Bamboo Curtain. A moist instructive article appeared in *Science*[6]; it cited reports that in 1958 sixty-five thousand tons of benzene hexachloride were produced in Communist China and that sixty pounds of indigenous insecticides were applied to every acre of cultivated land. One photograph shows Chinese workers stirring iron pots in the backyard of a rural insecticide production shop and another illustration is of an admired peasant who, with his family, captured and killed thirty thousand sparrows in the winter of 1957. Enough is revealed to show that technological intervention in ecology is not exclusively a by-product of the free enterprise system. We conclude that statements about pesticides should be examined for their reliability without prejudging them on the basis of the affiliations of their authors.

(3) — and I quote you — "Thalidomide and DDT are certainly part of the same scheme, not to say suicidal conspiracy, as nuclear warfare." Well, I don't think you can lump such things together and then accuse them of guilt by association. They are not actually related just because they are products of technology and of recent origin. Crimes of violence are so common in Central Park that many people shun it. Yet I would not cite this as a reason for concluding that parks are undesirable, dangerous, and should be abolished. If you will accept for reading a reference on DDT, I recommend the seldom-read monograph by Simmons and co-workers[7] which has a bibliography of 1556 literature citations and from which I have quoted[8] regarding the millions of lives saved or prologned by DDT. Undoubtedly each new scientific finding has far greater possibilities than formerly for affecting vast numbers of people and large areas of the earth's surface because of the expansion in industry, communications, and transportation. Furthermore, technology is expanding at a precipitous rate. We watch and participate in a climactic event in history, marked by a sudden flowering of the tree of knowledge. Even with all its dangers, frustrations, despoliations, and cataclysms, is this not the greatest age in which we could have lived? We cannot turn our backs on the future, we can only help our children to meet it.

(4) "The management of vegetation is wantonly upset by the indiscriminate application of non-selective herbicides." If this is so, let us encourage more research into the discovery of highly-selective chemicals, and let us explore all other possibilities for the control of weeds. I don't think we shall return to the days of "The Man With The Hoe." The subject of vegetation management, or interference as Dr. Fosberg terms it, is so large, complex, and varied that surely it must be approached on the basis of the specific problems for each locality under consideration. The beauties of *Daucus carota,* which goes by the delightful name of Queen Anne's lace, are obscured to the farmer who finds it in his hay; the bright flowers of wild mustard do not compel admiration when they are studded through a field of young wheat. I have worked on a farm; I have spent days in chopping at Canada thistles and in pulling pigweed by hand; I have gained confidence in the ability of intruding wild plant species to survive efforts to eliminate them. The browning of roadsides and rights-of-way is unsightly—*in summer time.* But do we not hail a few weeks later the anticipated arrival of the legions of Jack Frost which withers and strips the leaves in Nature's pageant?

(5) "Current recreation policies are detrimental to the conservation of natural vegetation." This problem is mitigated to some extent by the tendency of modern human beings to congregate in droves. It seems relatively easy to herd them into an assigned picnic ground or swimming pool. A few eccentrics stray into the periphery, especially if they are encouraged to do so by planting streams with fish. Most people, however, will stay in designated areas if they are told that the back country contains rattlesnakes. Miss Weadock[9] says that wilderness camp sites should be for those who know and appreciate what camping really is. True enough, but who will rule on their qualifications? I shall finish by giving my own recipe: A knapsack, a few pounds of dried food, a billy-can, a ground sheet. Strike away from the John Muir trail; climb above timber line, and follow the stream until it disappears in the talus. No one will follow you. Here you will find a few dead twigs of the arctic willow enough for a small fire to heat a pot of cocoa. Your companions will be the hoary marmot, the rosy finch, the white parnassus, and the yellow hulsea.

Sincerely,

Tom Jukes

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Left, above. At the side of this round tower of the Normandy-style home of Mrs. Lila Tyng, "Lu Shan," in Gladstone, New Jersey, is the approach to the gardens from which there is a broad view of the surrounding valley and hills.

Right, above. Wide terraced grass steps, an unusual landscape feature, lead to the lawn on the south side of "Lu Shan."

1964 SPRING GARDEN TOUR

Below. "Shale," the distinguished residence of Mrs. H. Rivington Pyne in Far Hills, New Jersey, was built by the architect William Delano in 1926 and remodeled in 1953. It is situated on one hundred and fifty acres of natural woodland on the north branch of the Raritan River.

Visitors on the Spring Garden Tour walk down the wide grass path, bordered by perennials, *Rosa rugosa,* and other shrub roses, to the swimming pool.

Clipped yew forms an intriguing maze in this garden at "Lu Shan."

This grape trellis extends along one side, with a hedge of American holly, *Ilex opaca,* enclosing the opposite side of a garden at "Shale," in which a variety of perennials are grown against a background of colorful azaleas.

Mrs. Richard N. Gambrill welcomes members of The New York Botanical Garden and others on the 1964 Spring Garden Tour at the entrance to her home and gardens, "Vernon Manor," in Peapack, New Jersey. The handsome Georgian brick house was remodeled by the late James Cameron Mackenzie in 1928. The wall garden, laid out by the late Ellen Shipman at the same time, has been redesigned by Alma A. Alison.

Upper right. A view from "Vernon Manor" of its farmland and the rolling Somerset Hills.

Left. Pillar topiaries of yew, with lilacs behind them, furnish a handsome setting for the swimming pool at "Vernon Manor."

Left below. An old apple tree, encircled by a wrought-iron bench, is the feature in the entrance courtyard to the home of Mrs. Neville Jay Booker in Gladstone, New Jersey.

Below. The lawn, framed by perennial borders, stretches down to the pond which is fed by a lively stream. In the right background visitors examine the effective planting of bulbs and perennials in light shade.

Upper left. Visible across the placid pond is one of the rock gardens for which "Allwood" in Far Hills, New Jersey, is famous. Leonard J. Buck, with the assistance of landscape designer Zenon Schreiber, has transformed the rock formations and natural woodlands of his property into "a veritable rock garden paradise."

Upper right. A close-up of one of the rock formations, uncovered in removing dense growth in the woods and now tastefully planted with suitable rock and alpine plants.

Left. Visitors, on returning to the buses, pass the propagating house and nursery of "Allwood."

Wisteria drapes gracefully over the openwork brick balustrade separating two of the several interesting terraces around the home of Mr. and Mrs. Donald F. Hyde on their four-hundred acre farm in Somerville, New Jersey. Changes in the house, which dates back to Colonial days, have given it a Greek revival appearance; additions have been made to accommodate Mr. and Mrs. Hyde's extensive library, noted for its collection of Dr. Samuel Johnson and his eighteenth-century circle.

Right. Tour participants board the bus for the return trip to New York, having thoroughly enjoyed their visits to beautiful homes and gardens under ideal weather conditions.

BRIEF NOTES ON RECENT BOOKS

FLOWERS

AFRICAN VIOLETS AND THEIR FAMILY. Odom, Mary Margaret. 119 pages, illustrated, indexed. Mrs. W. H. Odom, Marshall, Mo. paper $3.98.

"Designed as a working manual, to be referred to as the occasion may arise, not as a book to be read and laid aside," *African Violets and Their Family* provides a wealth of information on the history, culture, disease and pest control of this widely popular group of plants. Chapter XII lists and briefly describes over sixteen hundred named varieties.

LET'S GROW LILIES. Howe, Virginia, (ed.) 48 pages, illustrated. The North American Lily Society, E. L. Stokes, 21 Oakland Street, Lexington, Mass. $1.00

The sixteenth yearbook of The North American Lily Society is devoted to lily culture. Among the authorities contributing to its pages are Jan de Graaff and L. H. McDaniels on culture, S. L. Emsweller on propagation, and Philip Briarly, Charles F. Dancette, and Frank McWhorter on insects and diseases.

THE MINIATURE ROSE BOOK. Pinney, Margaret E. 149 pages, illustrated (part color), glossary, index. D. Van Nostrand Company, Inc., Princeton, N. J. 1964. $5.95.

This is the first definitive book on miniature roses, and it is written from the author's experience in growing them in her garden, in her greenhouse, and on the window sills of her home. Mrs. Pinney tells how to grow them, how to use them in gardens, how to use them in flower arrangements, and meticulously describes over one hundred and fifty varieties. Most of the descriptions are accompanied by a line drawing of an identifying characteristic.

Not only has the author grown miniature roses for the past twenty-five years, but she has also seriously studied their history and ancestry. Several of her articles on these tiny, fascinating plants have been published in *The Garden Journal.*

THE CAMELLIA TREASURY. Kincaid, Mrs. Paul. 218 pages, illustrated (part colored), indexed. Hearthside Press, Inc., New York. 1964. $9.95.

Within the pages of this attractive book there are cultural directions for the beginners among camellia growers, information on propagation and greenhouse culture for the more experienced, brief descriptions of recommended varieties, guide line for grooming blooms for show, and techniques on arranging these lovely flowers in period styles in the Japanese manner.

Mrs. Kincaid has been growing, showing, and arranging camellias for a number of years, has lectured about them, and is an accredited judge for the American Camellia Society.

ANNUAL AND BIENNIAL FLOWERS. Balfour, A. P. 150 pages, illustrated (part color), indexed. St. Martin's Press, New York. $6.95.

A hard-cover edition of a Penguin Handbook bearing the same title, which was originally published in 1959. The book has been brought up to date and reset in larger format, and eight colored illustrations have been added.

The author is holder of the Victoria Medal of Honour—the highest personal award of the Royal Horticultural Society.

THE PICTURE BOOK OF PERENNIALS. Nehrling, Arno and Irene. 286 pages, illustrated (part color), indexed. Hearthside Press, Inc., New York. 1964. $5.95.

The authors, both widely known in the horticultural world, consulted landscape architects and professional and amateur gardeners throughout this country when they were preparing the text for this, their sixth book. The result is an appraisal of the perennials important in today's gardens, pointing out their poor as well as their good characteristics.

Basic procedures in cultivation and modern methods in controlling insect pests and diseases are adequately covered; useful are the lists of perennials for various situations and conditions.

The book is appropiately named, for it is illustrated with many black and white photographs and line drawings, and there are several colored plates.

GENTIANS FOR YOUR GARDEN. Klaber, Doretta. 141 pages, illustrated (part color), indexed. M. Barrows and Company, New York. 1964. $4.50.

Earlier books about gentians have been written by Englishmen and Scotsmen—this is the first to be written by an American. Mrs. Klaber grew most of the one hundred species and hybrids, which she discusses, in her rock-garden nursery in Pennsylvania. She also includes the comments and observations of others who have grown these exciting blue-flowered plants in this country and abroad. Forty-six gentians are illustrated by the line drawings she made from living specimens.

GARDENS

FOR BETTER GARDENS. Browne, Roland A. 278 pages glossary, appendix, indexed. Doubleday & Co., New York. 1964. $4.95.

This is a delightful book. The author in imparting information on gardening, which he acquired in the transition from an apartment dweller to home owner in a suburban development, does so with enthusiasm and good humor.

Mr. Browne, who writes the column "For Better Gardens" in *Woman's Day*, "proves the point that a beginner can learn the ins and outs or horticulture, if he is willing to give the matter enough time, thought, and effort . . ."

ROCK GARDENS. Anderson, E. P. 135 pages, illustrated, (part color), indexed. St. Martins Press, New York. 1964. $6.95.

This is a hard-cover edition of a Penguin Handbook of the same name published originally in 1959, to which have been added nine colored illustrations, descriptions of some plants omitted from the paperback edition and recent introductions, and modifications of some statements in the light of further experience.

Mr. Anderson, long a member of the Alpine Garden Society, served as its president from 1948-1952. He has not only grown a vast number of rock garden plants, but has collected them in the United States as well as in Europe, and is very well informed.

SPECIAL PLANTS

THE CACTACEAE. Britton, N. L., and J. N. Rose. Vols. 1-4, bound as 2 Vols. Total number of pages 559, appendix, indexed, illustrated. Dover Publications, New York. 1963. Set $20.00.

An unabridged and unaltered republication of the second edition published in 1937. This comprehensive study of the Cactus Family covers 124 genera and 1,235 species and was begun by the authors in 1904. The original *The Cactaceae* was published in 1920 as Publication No. 248 of the Carnegie Institution of Washington.

SEASIDE PLANTS OF THE WORLD. Menninger, Edwin A. 303 pages, illustrated, indexed. Hearthside Press, Inc., New York. 1964. $9.95.

This "encyclopedic guide to planning, planting, and maintaining salt-resistant gardens" is based on the author's twenty-five years of experience in operating a nursery near the seashore where he grew plants that would endure buffeting by wind, sand, and salt water; his observations on the behavior of plants under such conditions; his collection of data; and reports and world-wide correspondance bearing on the subject.

More than fifteen hundred species in almost nine hundred genera are included in this work (some four hundred of the plants being illustrated). It is a real contribution to horticultural literature.

FLOWER ARRANGEMENT

THE ART OF FLOWER ARRANGEMENT. Edwards, Norman. 192 pages, illustrated. The Viking Press, Inc. 1964. $10.00.

A student of art, later an instructor in the fine arts, and then art director of the Greek Theater in Berkeley, California, of the Rochester American Opera Company, and of the Eastman Theater in Rochester, New York, Mr. Edwards in recent years turned his attention to flower arrangement. This form of art now dominates all his other interests; he teaches and lectures on this subject on the West Coast.

In *The Art of Flower Arrangement* he explains the vital elements of good design, the mechanics necessary, methods of working—all of which are well portrayed by Aleam and John Miller's fine photographs.

BONSAI

BONSAI FOR AMERICANS. Hull, George F. 256 pages, illustrated, glossary, indexed. Doubleday & Company, Inc., Garden City, N. Y. 1964. $5.95.

Mr. Hull gardens with keen interest and enthusiasm, as is evident from his home grounds in which he has a collection of flowering crabapples, boxwood, and over forty different hollies. When his interest spread to bonsai, he turned to the Brooklyn Botanic Garden, to bonsai societies in this country, to Japanese experts here and in Japan, to learn about this method of training trees, Now having practiced the art for several years, he has written *Bonsai for Americans.* Most of the illustrations are Mr. Hull's, for he is not only an ardent gardener, but a writer, editor, and head of the photographic department of the *Chattanooga Times.* There are step-by-step photographic records of the transformation of small plants into minia-

ture trees, training and potting methods, and examples of bonsai in Japanese and American settings.

The text covers the growing and displaying of bonsai in Japan and how similar methods can be applied in this country; tips on hastening the training process; where plants adaptable to such training can be found; and so forth. He does not include all the techniques which can be employed in developing and caring for bonsai—only those with which he has had personal experience.

Mr. Hull "debunks" the notion that it takes a lifetime or more to create a bonsai. "As bonsai, species of plants have about the same lifespan as in nature. Normally short-lived flowering and fruiting varieties still tend to be short-lived when grown in containers." He believes, and rightly so, that "the art of bonsai is in the skill of the grower," and that age is of relatively less value.

SHRUBS

HANDBOOK ON FLOWERING SHRUBS. 68 pages, illustrated. Brooklyn Botanic Garden Brooklyn, N. Y. 1964. $1.00.

Basic information on the best shrubs for any given situation or use and their care—from soil preparation and planting to the pruning of mature specimens.

In a twenty-four page section seven horticulturists describe shrubs which are particularly successful in their respective regions.

POISONOUS PLANTS

VENEMOUS AND POISONOUS ANIMALS AND NOXIOUS PLANTS OF THE PACIFIC REGION. Keegan, H. L. (ed.) and W. V. MacFarlane (ed.). 456 pages, illustrated, author index. (Pergamon Press) The Macmillan Co., New York. 1963. $21.00.

This book includes most of the papers presented in the symposium under the same title in the Public Health and Medical Science Division of the Tenth Pacific Science Congress, held at the University of Hawaii, 1961, and sponsored by the National Academy of Science, Bernice Pauahi Bishop Museum, and the University of Hawaii.

Chapter titles under Section 1, Plants, are "The Poisonous and Urticating Plants of Australia," "Poisonous Plants on Guam," and "The Pain-Producing Properties of the Stinging Tree."

MISCELLANY

AMERICAN ROSE ANNUAL. American Rose Society. 256 pages, illustrated (part color). American Rose Society, Columbus, Ohio. 1964. $4.50. (or included with **American Rose Magazine,** in Society's annual membership fee of $5.50).

This year's Annual emphasizes the importance of soil and reveals some of the most recent research in this field. There are interesting articles on rose growing in various areas of the United States and other parts of the world, virus diseases on roses, foliar leaching, propagating, and hybridizing, and on what to look for when purchasing a rose.

"Proof of the Pudding" and the "New Roses of the World" sections are valuable annual features.

CARAVAN PARKS. 52 pages, illustrated, appendix. Ministry of Housing and Local Government, London. British Information Services, New York. 1964. $1.00.

Since caravans—trailers—now provide homes for many families, the Ministry of Housing and Local Government has published this book on "location, layout, and landscape." The general appearance and convenience of many trailer camps in America would be improved, if some of the information in this book were heeded.

CROP PRODUCTION IN A WEED-FREE ENVIRONMENT. Woodford, E. K. (ed.) 114 pages, illustrated. Beachwell Scientific Publications, Oxford, 1963. F. A. Davis Co., Philadelphia. Paper $3.95.

These papers were presented at the Third Symposium of the British Weed Control Council in October, 1962, covering the use of herbicides in eliminating weeds in agricultural and horticultural crops and in forestry and such topics as "The Oxygen Requirements of Soils and Plant Root Systems," "Effect of Rain or Irrigation on Soil in Relation to the Presence or Absence of Plant Cover," "Soil Erosion, "Compaction," and "The Problem of Weed Seeds in the Soil."

A GARDEN POTPOURRI. Editors, The Garden Club of Virginia Journal. The Dietz Press, Inc., Richmond. 1963. $3.95.

More than one hundred and seventy-five of the best articles that have appeared in *The Garden Club of Virginia Journal* have been compiled by the Editors into "an anthology of ideas." Topics range from plant origins, conservation, preparation of plants for exhibitions, dried arrangements, arrangements for special occasions, herbs, fruits, vegetables, azaleas, camellias, roses to specialized gardens, and garden structures and accessories.

KEEP YOUR GARDEN HEALTHY. Pyenson, Louis. 256 pages, illustrated, indexed, appendix. E. P. Dutton Co., Inc., New York. 1964. $4.95.

A fine guide book on cultural practices which benefit plants and on control practices which protect them against their enemies. The emphasis is on *safe* methods. This is the first book for the home gardener in which the dangers of pesticides are balanced against the importance of chemical controls.

Dr. Pyenson, plant pathologist and entomologist, is Chairman and Professor of the Biology Division at the State University Agricultural and Technical Institute at Farmingdale.

THE NEW YORK TIMES BOOKS OF HOME LANDSCAPING, OF LAWN CARE, OF TREES AND SHRUBS. Faust, Joan Lee (ed.) Alfred A. Knopf, New York. 1964. Each $2.95.

For these three books, Miss Faust has selected articles from the pages of the Garden Section of *The New York Times,* of which she is Editor.

James L. Caldwell, Barbara M. Capen, Walter Singer, Staff Photographer of The New York Botanical Garden, and Donald Wyman, Horticulturist of The Arnold Arboretum, are among the contributors to *Home Landscaping;* Dr. John F. Cornman of Cornell University Dr. Ralph S. Engel of Rutgers The State University, and Dr. Marvin H. Ferguson, National Research Coordinator of the United States Golf Association, are authors of articles in *Book of Lawn Care;* Dr. Frances de Vos, Assistant Director of the National Arboretum, Dr. George S. Avory, Jr., Director of the Brooklyn Botanic Garden, Harry Dengler, Robert Clark, and Clarence E. Lewis among the authors of *Book of Trees and Shrubs.*

AMERICA'S GARDENS. The Editors of Better Homes and Gardens. 208 pages, illustrated (many in color), indexed. Meredith Press, Des Moines, Iowa. 1964. $9.95.

A discriminating selection of fine photographs, black and white and in color, of gardens private and public from coast to coast, accompanied by concise, explanatory text. Formal gardens, natural gardens, colonial and contemporary gardens, gardens reflecting English, French, Italian and Japanese influence are depicted. You will enjoy viewing in picture those you have visited in person as well as those you have yet to visit.

THE COMPLETE BOOK FOR GARDENERS. Snyder, Rachel, ed. 508 pages, illustrated (part colored), indexed, glossary. D. Van Nostrand Co., Princeton, New Jersey. 1964. $9.95.

The more advanced as well as the novice in gardening will find it worth while to have this comprehensive guide in his home library. The text is well organized—with chapters under seven divisions and sub-heads under each chapter—so there is no difficulty in finding just the information you may be seeking at a particular time.

The comparison charts of flowering trees, shrubs, vines, perennials, hedge material, etc., are also very useful.

WILD FLOWERS TO KNOW AND GROW. Hersey, Jean. 235 pages, illustrated (part color) bibliography, indexed. D. Van Nostrand Co., Inc., Princeton, New Jersey. 1964. $6.95.

This is an attractive, easily read beginner's work illustrated with photographs as well as color paintings. The author explains habitat, propagation, and conservation and gives ideas for gardens in special situations. A list of dealers in wild plants and seeds and a list of "wild flower preserves, trails and areas to be visited" are useful appendices.

PEACOCK MANURE AND MARIGOLDS. Gillespie, Janet. 184 pages, illustrated, bibliography, indexed. The Viking Press, New York. 1964. $3.95.

This is an amateur gardener's practical approach to gardening without dangerous chemicals. The author has gathered ideas and recipies from friends, books, and pamphlets and tried many of them herself. Having once used many poisons and chemicals in her garden, she often gives valuable comparisons with her present practices. The book is entertaining to read, and although few gardeners will want to use natural methods of pest control to quite this extent, one may learn of many valuable remedies and ideas for better gardens.

HARDY GARDEN BULBS. Wister, Gertrude S. 176 pages, illustrated, bibliography, indexed. E. P. Dutton & Co., Inc., New York. 1964. $4.50.

This book is a clear, concise introduction for the beginner. Mrs. Wister knows her subject from the literature as well as practical experience and draws on this knowledge to give a

fresh look at the subject instead of the rehash of other books which we too often get. Particularly valuable are her lists of specific varieties with comments as to their suitability for various purposes. A glossary of terms, list of dealers, and reading list are also useful.

THE PLANT KINGDOM. Bold, Harold C. 118 pages, illustrated, indexed. Prentice-Hall, Inc. Englewood Cliffs, N. J. 1964. Cloth $3.95, paperback $1.75.

The Plant Kingdom, one of the Foundations of Modern Biology Series, was first published in 1961. In this second edition "new and relevant information and more meaningful material has been included." The author, who is Professor and Chairman of the Department of Botany at the University of Texas, and editor-in-chief of *The American Journal of Botany*, is an authority on soil algae and plant morphology.

WATER METABOLISM IN PLANTS. Kozlowski, Theodore T. 227 pages, illustrated, indexed. Harper & Row, Publishers, New York. 1964. paper $3.95.

One of Harper and Row Biological Monographs, this "encompasses important aspects of water metabolism in plants at the cellular and whole-plant level." Its chapters on "Xerophytism and Plant Water Balance," Water Relations of Plant Cells and Tissues," "Absorption of Water," "Water Transport," "Loss of Water," and "Effects of Water Deficit on Plants" should interest soil scientists, plant physiologists, ecologists, foresters, horticulturists, and others concerned with soil-plant interrelationships.

THE IDEAS OF BIOLOGY. Bonner, John Tyler. 180 pages, illustrated, glossary-index. Harper and Row, Publishers, New York. 1964. paperback $1.45.

This book, originally published in the Harper Modern Science Series in 1962, is now published as one of Harper Torch books.

FLORA OF SOUTHEASTERN WASHINGTON. St. John, Harold. 583 pages, illustrated, indexed. Outdoor Pictures, Escondido, Cal. $5.95.

A mild revision of this Flora, which was first published in 1937.

NATIONAL PARKS. Jensen, Paul. 165 pages, illustrated (part color), indexed. Golden Press Inc., New York. 1964. $4.95.

The author's interest in our National Parks was aroused when several years ago, a staff member of the National Geographic Society, he was assigned to visit some of them. He also worked on the Society's book *America's Wonderland*.

With this background and because of his own deep interest in the parks, Mr. Jensen has created a book which should appeal to the many thousands who annually visit them—a book to read before starting on the trip, a book to take along on the trip, for it includes useful tips on camping, on what to avoid and what to do, as well as descriptive text.

THE FOREST. Farb, Peter, and the Editors of Life. 192 pages, illustrated (part color), indexed, glossary. Silver Burdett Company, Morristown, New Jersey. 1964. $2.98.

This volume has been adapted from material in *Life* Nature Library for the Silver Burdett Reading and Research Program designed for use within classrooms. It could well be added to home libraries.

GENETICS AND THE ORIGIN OF SPECIES. Dobzhandsky, Theodosius. 364 pages, indexed. Columbia University Press. $2.45.

This is a Columbia Paperback of the "Third Edition, Revised," published in 1951.

BOOK REVIEWS

ATOMIC ENERGY ENCYCLOPEDIA IN THE LIFE SCIENCES. Shilling, C. W. (ed.) 474 pages, Illustrated. W. B. Saunders Co., Philadelphia. 1964. $10.50.

This large, handsomely prepared volume is precisely what its title would lead one to expect. It is a concise, accurate, up-to-date compendium of the interrelations and uses of atomic level physics in the biological sciences. The individual entries tend to be somewhat brief with correspondingly less information than would be found by examination of other books in the field. As a basic reference volume for an editor, reference librarian, or even for a science-oriented household, this encyclopedia will be useful.

RICHARD M. KLEIN

THE STORY OF THE PLANT KINGDOM (Rev. Ed.). Dittmer, Howard J. 467 pages, illustrated, indexed. University of Chicago Press, Chicago. 1964. $5.75.

Merle Coulter's *Story of the Plant Kingdom* (1935), here revised by Howard Dittmer, has been reorganized and rewritten in this third edition and may be regarded as essentially a new book. The original purpose, to provide "a respectable minimum of general education" in botany, is continued in the present edition. As might be expected from the title, emphasis is placed on the broad taxonomic-evolutionary picture, as perceived mainly from morphological data, and other aspects of botany get relatively short shrift. This is deliberate and is no cause for criticism. The book was originally designed to fit into the famous B-Z-P sequence in the curriculum of the University of Chicago, in which physiology is the subject of a separate course.

The presentation is simple and informative, but in many instances distressingly inaccurate. Often the author seems to strike the nail a glancing blow instead of hitting it squarely on the head. The illustrations are in general adequate, but hardly outstanding. In addition to the two hundred and twenty-one numbered figures, each chapter is introduced by an untitled, fullpage, impressionistic silhouette photograph; many of these can be recognized by the initiate as representing familiar kinds of plants.

There is doubtless a need for a book which does what this book tries to do. One might hope that there will be an extensively corrected new printing or new edition in the near future.

ARTHUR CRONQUIST

THE SECRET LIFE OF THE FLOWERS. Dowden, Anne Ophelia. 45 pages, illustrated (color), indexed. The Odyssey Press, Inc., New York. 1964. $.95.

The Odyssey Library is (as its publishers say) a new concept in publishing: a series of small books, offered at an astonishingly low price, illustrated by first-class color paintings, and written by a competent student of the special subject included. For the present volume Anne Ophelia Dowden made a series of paintings with the exquisite care and accuracy of all her work. A brief introduction deals with reproduction by flowers and is followed by many examples of pollination, mostly by insects, and illustrating the incredibly diverse forms and functioning of flowers in relation to the pollinating agents.

There are a few mis-statements—to be expected from any writer who is not a professional botanist. I wish I had had a chance to correct them before publication; but since I didn't, I am not going to mention them here. The book is a little gem, a delight to the eye; and highly recommended to anyone who appreciates flowers and would know something of this "secret life."

H. W. RICKETT

DOCTOR DARWIN. Pearson, Hesketh. 244 pages, index, appendices. Walker and Company, New York. 1964. $5.00.

CHARLES DARWIN AND NATURAL SELECTION. Dickinson, Alice. 212 pages, index, bibliographical foreword, chronological table. Franklin Watts, Inc. 1964. $2.95.

Popular biography, in its attempts to amuse while instructing, raises various problems for the biographer. Hesketh Pearson has the reputation of having solved these problems; in this early book (originally published in 1930) some of the difficulties of the genre are apparent. Taking as subject Charles Darwin's fascinating grandfather Erasmus, Mr. Pearson has constructed a general portrait of the society and temper of eighteenth-century England rather than given a concentrated account of the thinker, inventor, poet, Doctor Darwin. The occasional verbal whimsies introduced to lighten the tone are more likely to annoy than amuse.

Alice Dickinson's *Charles Darwin and Natural Selection* is a further volume in the Immortals of Science Series. This is an example of a well-written introductory study as opposed to popular biography. A clear and sharply focused picture of Charles Darwin's personality, accomplishments, and importance in the history of science emerges from Miss Dickinson's book. It would be a useful addition to the library of any interested young person.

HARVEY SIMMONDS

MOUNTAIN FLOWERS OF NEW ENGLAND. Harris, Stuart K., Jean H. Langenheim, and Miriam Underhill. 147 pages, illustrated (part colored) and indexed. Appalachian Mountain Club, 5 Joy Street, Boston, Mass. 1964. $4.50.

This latest addition to the publications of the Appalachian Mountain Club should be enthusiastically welcomed not only by its own members but also by non-members who hike the mountains of New England and the Adirondacks in New York. In addition, nature-minded travelers on the Gaspesian Peninsula will find this book an excellent complement to *A Flora of Bic and the Gaspé*, a National Museum of Canada publication. All of these mountain flowers of New England are found in the Gaspé

(Continued on page 204)

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(For detailed information about a particular event or course, write or phone LU 4-8500.)

Mrs. William C. Steere presents certificate to a graduate in Children's Gardencraft.

GRADUATION EXERCISES OF CHILDREN'S GARDENCRAFT on Saturday, September 12, 1964, at 10 a.m., Auditorium, Museum Building.

SATURDAY AFTERNOON NATURE WALKS begin Saturday, September 12, 1964. Starting point, Museum Building, 1:30 p.m.

ELEMENTARY BONSAI—morning class, 10 a.m.-12 noon; evening class, 8-10 p.m. Starts September 15, 1964, Museum Building.

"GENERAL INTRODUCTION TO THE ART OF BONSAI," illustrated Saturday Afternoon Lecture and demonstration by Yuji Yoshimura, on September 12, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music. The Bonsai Society of Greater New York will exhibit bonsai during Mr. Yoshimura's talk and on the next day.

CHILDREN'S PLANT NATURE STUDY—9:30-11:30 a.m. Starts September 19, 1964, Museum Building.

"SECRETS OF LIFE," Disney True-Life Adventure Series, colored film, Saturday Afternoon Program on September 19, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

PLANT MORPHOLOGY AND PHYSIOLOGY—morning class, 10-11 a.m.; evening class, 8-9 p.m. Starts September 21, 1964, Museum Building.

FLOWER AND LANDSCAPE PAINTING IN WATER COLORS—9:45 a.m.-12:30 p.m. Starts September 22, 1964, Museum Building.

BOTANY FOR BEGINNERS—morning class, 10 a.m.-12 noon; evening class, 8-10 p.m. Starts September 23, 1964, Museum Building.

ECONOMIC PLANTS, IN-SERVICE COURSE FOR TEACHERS, 3:45-5:25 p.m. Starts September 23, 1964, Museum Building.

CULTIVATION OF TREES AND SHRUBS—morning class, 10-11 a.m.; evening class, 8-9 p.m. Starts September 23, 1964, Museum Building.

FLOWER AND LANDSCAPE PAINTING IN WATER COLORS, 9:45 a.m.-12:30 p.m. Starts September 25, 1964. Museum Building.

"PLANT TRIP THROUGH THE REPUBLIC OF THE CONGO," illustrated Saturday Afternoon Lecture by Dr. Llewelyn Williams, on September 26, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

"A BOTANICAL AMATEUR IN THE ORIENT," illustrated Saturday Afternoon Lecture by Victor Greiff on October 3, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

HOUSE PLANTS IN FALL AND WINTER—morning class, 10 a.m.-12 noon; evening class, 8-10 P.M. Starts October 5, 1964, Museum Building.

INTERMEDIATE AND ADVANCED BONSAI—morning class, 10 a.m.-12 noon; evening class 8-10 p.m. Starts October 6, 1964, in the Museum Building.

SATURDAY AFTERNOON PROGRAM—"Vacation in Jasper," "Trans-Canada Journey," "Blue Water Holiday," Canadian Travel Film Library, on October 10, 1964 at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

"PARIS AND ITS GARDENS," illustrated Saturday Afternoon Lecture by Alice Dustan Kollar, on October 17, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

CHILDREN'S PLANT WORKSHOP—10:30-11:30 a.m. Starts October 17, 1964, in the Museum Building.

LANDSCAPE GARDENING—evening class 8-10 p.m. Starts October 20, 1964, Museum Building.

"BRIGHT FLOWERS FROM AFRICA," illustrated Saturday Afternoon Lecture by Richard A. Howard, on October 24, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

THEATER BENEFIT—"Beekman Place" by Sam Taylor, starring Constance Cummings and Ferdinand Gradet, at Morosco Theater, 8:40 p.m., on October 27, 1964.

NATIVE PLANT SYMPOSIUM under auspices of Native Plant Garden Committee, 10:30 a.m.-3:00 p.m., October 28, 1964, at The New York Botanical Garden.

"NATURE IN THE BRONX IN SUMMER AND FALL," illustrated Saturday Afternoon Lecture by Dr. Theodore Kazimiroff, on October 31, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

Admission to Saturday Afternoon Lectures, 25 cents, free to Members of the Garden (upon presentation of Membership Card).

Nature Walks, fee $1.00 per person.

For fees of the various courses, see the Educational Program.

Edgar A. Whitney, A.W.S., holds a class in flower and landscape painting outdoors at the Garden.

NEWS, NOTES and COMMENTS

A bronze plaque, inscribed as follows, will be erected in the Research Laboratory:—

Dedicated to the Memory of
BERNARD OGILVIE DODGE
who spent the last years of
his life in this laboratory
in the effective pursuit of
his chosen profession
1872 - 1960

Municipal Cooperative Education Program. The New York public school system is now seeking funds to continue the trainee program which has been carried on at The New York Botanical Garden the past eleven months. Dr. Bernard E. Donovan, Executive Deputy Superintendent of Schools, made this statement at a luncheon-meeting held at the Garden during this past summer.

Thirty juniors from Christopher Columbus High School, who began their training as gardeners last September, will continue work at the Garden through the coming school year.

There is no shortage of applicants for the program. Edward R. Kolevzon, Principal of Christopher Columbus High School, reported that applications already equal the number of high school youths presently enrolled in the program, which is aimed at preventing high school drop-outs by giving students a renewed interest in their academic studies through related on-the-job experience and a regular source of income. Mr. Kolevzon stressed that the program has been academically rewarding. Trainees have developed new interest in school, which is reflected in better attendance, punctuality, and scholarship.

Reporting on behalf of The New York Botanical Garden, T. H. Everett, Assistant Director (Horticulture), said that "It has been astonishing to see the transformation of these boys in nine months." He pointed out that jobs await young men trained in horticulture. Gardeners who were trained in Europe formerly came to the United States in large numbers; but they now remain in their home countries, leaving a shortage of skilled men in this country. "Wherever we go," Mr. Everett said, "we find a crying need in the horticultural field for trained men."

"We wondered," commented Grace Brennan, Director of the Cooperative Educational Program for the city schools, "whether New York City boys would be interested in this gardening project. We are delighted with the results —there are thirty boys champing at the bit to enter a new program in the fall."

Funds required to continue the two-year program for a second group of trainees total $43,000 a year. "We haven't yet come up with the money," said Dr. Donovan, "but the matter will continue under consideration all summer."

Funds for the first group were collected through the efforts of Mrs. Arthur Hays Sulzberger, a member of the Garden's Board of Managers, who told the meeting that "the happiest experience of my life has been to be associated with this program."

Cooperative students are in full-time classes for the two years; during their junior and senior years, they attend classes and are employed in related jobs on an alternate-week plan. Students work in pairs, one at school and one at the job, so the job is always covered.

Botanical gardens are ideally set up for the training of horticulturists. The large plant collections, the varied gardens, and the trained scientific and research personnel, giving greater depth to any educational program, have been a large part of the reason for the great success of the high school trainee program at The New York Botanical Garden, according to Mr. Everett.

The Garden's Educational Program. Courses in plant sciences and in arts and crafts for all levels of interest and training will be given this fall in the Educational Program of The New York Botanical Garden.

Special for the newly-awakened plant enthusiast will be "Botany for Beginners" and "Beginning Bonsai." "Plant Morphology" and "Advanced Bonsai" will be offered for the more sophisticated.

Other courses opening in September or October for the fall term are: "Cultivation of Trees and Shrubs," "Flower Photography," "Flower Painting," "Intermediate Bonsai," "Children's Plant Study," "House Plants," "Children's Plant Workshop," "How-to-Prune," "Landscape Gardening," and "Nature Study for Teachers."

Saturday Afternoon Programs begin weekly at 3:15 p.m., September 12, with a bonsai demonstration and slide showing by Yuji Yoshimura, bonsai artist, author, and teacher. Weekly nature walks on the Garden grounds begin at 1:30 p.m., also on September 12.

For detailed information write to the Educational Department, The New York Botanical Garden, Bronx, New York 10458.

Staff Appointment. Dr. Tetsuo Koyama assumed the responsibilities of Associate Curator of Taxonomy at The New York Botanical Garden on July 1, 1964. He came to the Garden last year from the Plant Institute of the Canadian Department of Agriculture, Ottawa, and has served as Dr. Bassett Maguire's research associate.

Born at Tokyo in 1933, he was graduated from the University of Tokyo in 1956 with B.Sc. He received M.A. degree in 1958 and, in 1961, his doctorate in Science from the same University.

From 1958 to 1961 Dr. Koyama taught plant taxonomy and plant anatomy at a few universities in Asia, taking time in 1959 to study at major herbaria in the United States for his thesis. From 1961 to 1963 he was the educational official of the Japan Ministry of Education, and during this period was awarded a research fellowship in science by the National Research Council of Canada.

Specializing in the phylogenetic classification and monographic studies in the *Cyperaceae* (Sedge Family), Dr. Koyama is also interested in the systematic anatomy of monocotyledons and scientific pedagogy. Besides some eighty published papers, he has written a textbook of botany, *Colored Illustrations of the Herbaceous Flora of Japan*, Vol. 3, and worked for the English translation of *Flora of Japan*.

Unseasonal Leaf Drop. Leaves of many lawn and street trees fell unseasonably in late

Mrs. John Marx and Richard Van Duzer demonstrate roses in flower arrangements at the twenty-second annual Rose Day at the Garden; and Paul Frese, the speaker of the day's program, points out to a visitor the merits of a rose in the Rose Garden.

Left. Japanese visitors to the Rose Garden are interested spectators to an animated conversation among mother and sons.

Above. The Japanese visitors pose in front of the Japanese dogwood, *Cornus kousa*.

June and early July. Particularly hard hit were maples, tulip, and plane trees; others, such as oaks, also dropped some leaves.

The principal reason for the leaf drop, according to Dr. P. P. Pirone, Plant Pathologist of The New York Botanical Garden, is that aphids have weakened the leaves by sucking their juices. The presence of aphids (or plant lice, as they are sometimes known) may be detected by a sticky slick on the leaf surfaces. This is the "honey" aphids secrete. In some cases the offenders are scale insects; these are flat and most of the time immovable, while aphids are soft-bodied and active.

Contributory factors were the hot, dry weather and an excessive number of leaves produced in the spring.

Dr. Pirone advised spraying with malathion or other pesticide, and watering deeply and thoroughly.

Visitors to the Garden

Dr. Keith Jones, Royal Botanic Gardens, Kew, England.

Dr. David Dilcher, Yale University, New Haven, Conn.

Dr. David B. Lellinger and Dr. John J. Wurdack, Smithsonian Institution, Washington, D. C.

Dr. Hans U. Stauffer, University of Zurich, Switzerland.

Dr. Robert Bird, University of California, Berkeley.

Dr. Hermes G. Gutierrez, Philippine National Herbarium, National Museum, Manila.

Dr. Egbert H. Walker, U. S. National Arboretum, Washington, D. C.

Mrs. J. Frederick Waessner, University of Miami, Florida.

Dr. Robert H. Miller and Dr. Edward E. Terrell, New Crops Research Branch, U. S. Department of Agriculture, Beltsville, Maryland.

Dr. Morris Gordon, New York State Department of Health, Albany.

Dr. Phillis Stockdale, Mycological Institute, Kew, England.

Dr. J. W. Bodine, Philadelphia Academy of Sciences, Philadelphia.

Mary Mandelo and Robert Matthew, U. S. Army Natick Laboratories, Natick, Mass.

The Photographer's Lot . . .

I am forced to the conclusion that taking photographs of wild flowers is a hazardous occupation.

I am not referring to the adventures of our own staff photographer in a foreign country, but to those of the photographer for The New York Botanical Garden Wild Flower Books, Charles Johnson, here in the United States.

In the course of his enthusiastic search for all sorts of wild flowers, Charles crawled through a barbed-wire fence somewhere in Louisiana. Nothing unusual about that; like many of us, he has crawled through or over or under a good deal of barbed wire in the pursuit of his profession. So he set up tripod, camera, and lights and went to work. He was interrupted by a man in the uniform of the United States Army who informed him, none too gently, that he was where he should not be and that his camera and equipment, including all films, would be confiscated and his person detained. The validity of this information was energetically contested by our representative who could, of course, produce proper credentials. Nevertheless, with the arrival of additional military personnel (doubtless equipped with fixed bayonets, hand grenades, tear gas, and rockets—though this is my own speculation and not a part of Charles' account to me), things began to look rather grim for the illustrations of Volume 2. Finally, the debate having been referred to higher authority with the requisite shoulder ornaments, Johnson was allowed to depart—with equipment intact.

Another incident, which again demonstrates both the dangers of nature photography and the photographer's ability to talk his way out of danger, occurred in the Great Smoky Moun-

Visitors to the Garden this summer discussed plans with T. H. Everett, Assistant Director (Horticulture), for a four-hundred-acre forest garden to be planted in County Wexford, Ireland, in memory of President John F. Kennedy. From left are Anthony M. S. Hanan, Research Officer of the Forestry Division of the Irish Department of Lands; John P. Fanning, Senior Horticultural Inspector of the Irish Department of Agriculture; and Dr. T. J. Walsh, Director of the National Botanic Gardens, Dublin.

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tains. Johnson, with a guide, was busy photographing some plant near a small mountain stream in the forest, when he heard a noise behind him. Looking round, he saw a large black bear making his way upstream. At Johnson's movement, the bear sat back—or up— on his haunches, giving a convincing representation of the Largest Mammal in the eastern United States. Charles, somewhat nonplussed, greeted Bear kindly and addressed a few remarks intended to convey the idea, politely, that two's company, etc. The bear gave a noncommittal grunt and shuffled off through the brush.

Charles Johnson had over two hundred photographs by the end of May, when he flew into New York. Now he is again challenging fate in the further pursuit of lurking wild flowers.

H. W. RICKETT

The Garden Club of America, at its annual meeting held in Portland, Oregon, this past spring, presented a number of awards. Among them, its Achievement Medal to Mrs. Alvin Jennings who "has shared her horticultural knowledge and her ability to create beautiful exhibits and arrangements of tropical material, while her contagious enthusiasm and unceasing efforts have been largely responsible for the creation of two arboretums . . .

"Assisting her late husband, Colonel Robert Montgomery, her rare competence was invaluable in establishing the Montgomery Pinetum. A substantial part of this notable conifer collection was given to The New York Botanical Garden and the Pinetum itself was deeded to the Town of Greenwich.

"Later, her part was equally great in the creation of the Fairchild Tropical Garden, the only botanical garden in Continental United States for tropical and semitropical plants. Since Colonel Montgomery's death, her selfless devotion to the Garden has never slackened, and under her strong leadership, the Fairchild Garden continues to broaden in scope . . ."

The Garden Club of America's Medal of Honor was presented to Jan de Graaff "with a high standard of ethics, plus the ability and skill to produce new and outstanding plant material, has devoted a life time to hybridizing, growing, and marketing of lilies . . .

"Last year, with his wife, he gave outstanding help and hospitality to our Interchange Fellowship Scholar who was studying the hybridization of lilies. He has generously given thousands of flowers and bulbs for educational and civic purposes, and through his numerous articles, lectures, and lucid directions on labels he has shared his knowledge and given greatly of himself."

The Florens DeBevoise Medal was presented to Mrs. Alfred C. U. Berry whose "greatest interest, since girlhood, has been horticultural. She has climbed mountains and trekked through remote ravines and passes to secure small plants to bring back to her garden—where other gardeners could see and enjoy them.

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"Mrs. Berry is internationally known for her technical knowledge of alpine plants and as an authority on primulas . . .

"She raised from seed the deepest pink *Rhododendron trichostomum* in cultivation—which was named 'Rae Berry' in her honor, and she was the first woman ever to be presented with the Gold Medal by the American Rhododendron Society. When the beautiful *Rhododendron souliei* was completely lost to frost in Windsor Park, England, Mrs. Berry gave them plants almost identical in form ."

It is interesting to note that the medal awarded to Mrs. Berry is named in honor of another woman who was well versed in alpine and rock garden plants, the late Mrs. C. I. DeBevoise of "Cronamere," Greens Farms, Connecticut, and one of the founders of the American Rock Garden Society.

Root Glen at Clinton, New York, which has been cherished by the Root family for over one hundred years, most recently by Mrs. Edward Root, grand-daughter-in-law of Oren Root, will be provided for "in perpetuity" through the establishment of the Root Glen Foundation. Oren Root, who arrived at Hamilton College in 1849 to teach all the sciences, bought the ravine, "tamed and civilized it with trees and plants, some of them the gift of his friend and colleague Asa Gray."

A sloping half-acre within the Glen boundaries has been designed and planted during the past year by Mr. and Mrs. Lincoln Foster of Falls Village, Connecticut, with spring bulbs, azaleas, heathers, and other shrubs, Saunders hybrid peonies, iris, and lilies. Two raised beds of alpine plants have also been included.

The first director is Hendrik W. van Loon, a conservationist who is presently engaged in a five-year study of the effects of ground fire on a Norway-pine plantation near Marlboro, Vermont.

Awards to David Burpee. The National Sweet Pea Society of Great Britain presented the Henry Eckford Medal to David Burpee of Philadelphia for "his achievements in developing sweet peas" at the Society's show in Royal Horticultural Hall, Westminster, England. The medal commemorates the late Henry Eckford, known as the "Father of the Sweet Pea," whose work in the nineteenth and early twentieth century was the first step toward the transformation from the old wild type to the modern hybrid sweet peas.

Among Mr. Burpee's recent achievements in

(Continued on page 206)

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BOOK REVIEWS (Continued from page 200)

with the exception of a handful of endemics.

This handbook has many qualities to commend it to the amateur. It is small in size and compact. It is an excellent introduction to plant study in the field for the species are comparatively few, the keys are simple, the glossary is simple, and the illustrations are many. The committee is to be congratulated for its inclusion of the lichens, mosses, grasses, and the sedges. Most popular floras omit these groups, yet they are important components of the floristic whole. Incidentally, this reviewer would have preferred the color plates interspersed with some approximation to the descriptions, but this is a matter of personal preference rather than a critical note. Happily, taxonomy is not stressed, yet the authors should have included some reference to the manual supporting this study. Probably it was Fernald's revision of *Gray's Manual of Botany*.

In summation, this little book should not only add to the pleasures of hiking in the mountains but also add to the knowledge of the hiker. Serious application to its contents could probably add to the distributional knowledge of some of the rarer species therein.

J. Harry Lehr

Spring Valley, New York

GREEN MEDICINE. Kreig, Margaret B. 462 pages, illustrated, indexed. Rand McNally & Co., Skokie, Ill. 1964. $5.95.

Here's a book which speaks with the excitement of adventure about botanical explorations —and remains accurate most of the time. The emphasis is on medical and hallucenogenic drugs, with thrilling mystery hinted and detailed on the trials of drug sources of primitive or ancient peoples.

One fascinating story which is omitted is that of the discovery by Thomas MacDougal of the ancient Mexican drug ololiuqui in the heavenly blue morning-glory seed (*Ipomoea violacea* Linn, syn.: *I. tricolor* and *I. rubrocaerulea*, etc.). MacDougal found the contemporary Zapotecan peoples of Oaxaca still using the seed for its hallucenogenic drug. Miss Kreig tells how Dr. Richard Schultes of Harvard identified *Rivea corymbosa* as another source of the same drug.

There are interesting accounts of and reference to the research work and exploratory trips of The New York Botanical Garden, and photographs taken in the field of Dr. William C. Steere, Dr. Bassett Maguire, and R. Gordon Wasson.

Phil Clark

VISTAS IN BOTANY, Vol. 4: RECENT RESEARCHES IN PLANT TAXONOMY. Turrill, W. B. (ed.) xiii + 314 pages, indexed (author and subject). The Macmillan Co., New York. 1964. $14.00.

This collection of seven articles on various phases of plant taxonomy is directed to professional botanists, graduate students, and serious amateurs. The articles range from a penetrating inquiry into the principles of taxonomy to a prosaic set of instructions on how to prepara a flora. The authors are all distinguished botanists, who have something worth while to say to the botanical public. To this reviewer, the most interesting item is the paper on "Philosophy and Classification" by J. S. Gilmour and S. M. Walters.

Arthur Cronquist, Curator

THE ABSORPTION OF SOLUTES BY PLANT CELLS. Jennings, D. H. 204 pages, indexed, references. Iowa State University Press, Ames, Iowa. 1963. $4.25.

The author, who obtained his doctorate from Oxford University in 1956, is a member of the Botany Department of Leeds University. He has brought together in this book the experimental facts concerning the movements of solutes—salts, amino acids, and sugars—between plant cells and the external medium in order to compare these facts and to reveal the large number of factors which can influence solute movement.

Alma W. Barksdale

EXTRACHROMOSOMAL INHERITANCE. Jinks, John L. 177 pages, line drawings, indexed. Prentice-Hall, Inc., New Jersey. 1964. Paper, $2.95; cloth, $4.95.

This book is the third in a series known as the Prentice-Hall Foundation of Modern Genetics, edited by Sigmund R. Suskind and Philip E. Hartman of Johns Hopkins University.

The subject of extra-chromosomal inheritance —the transmission of traits by means other than chromosomal—is highly controversial. It is discussed here clearly and calmly. This is a book to be read by all students of genetics.

Alma W. Barksdale

FOUNDATIONS OF MODERN BIOLOGY SERIES, 2nd ed. McElroy, William D. and Carl P. Swanson (editors). Prentice Hall, Inc., Englewood Cliffs, N. J. 1964. Paper, $1.75; cloth, $3.95, each.

Prentice Hall and the editors of the Modern Biology Series are to be congratulated on their most successful revision of the volumes comprising this series of biology books. Each volume is an excellent general view of the field, and the revisions are sufficiently up-to-date to allow the reader to get a good idea of the current status and thinking of the subject. The titles include: *The Cell* (C. P. Swanson); *Cell Physiology* (W. D. McElroy); *Heredity* (D. M. Bonner and S. E. Mills); *Adaptation* (B. Wallace and A. M. Srb); *Growth and Development* (M. Sussman); *Animal Physiology* (K. Schmidt-Nielson); *Animal Diversity* (E. D. Hanson); *Animal Behavior* (V. G. Dethier and E. Stellar); *Man in Nature* (M. Bates); *The Life of the Green Plant* (A. W. Galston); *The Plant Kingdom* (H. C. Bold). A new volume, *Chemical Background for the Biological Sciences* (E. H. White) is a welcome addition to the series.

Botanically-oriented readers will profit from a serious reading not only of the two volumes devoted exclusively to plants but also by a careful examination of the books on *The Cell, Heredity, Growth and Development*, and especially the one on the *Chemical Background for the Biological Sciences*. Armoured by the information contained within these, the nonprofessional is ready to face the battles of modern plant science.

Richard M. Klein

GENETICS AND MODERN BIOLOGY. Beadle, George W. VIII + 73 pages, illustrated. American Philosophical Society, Philadelphia. 1963. $2.00.

The second annual Jayne Lectures of the American Philosophical Society were delivered at the University of Pennsylvania in March, 1962, by George W. Beadle, Nobel Laureate and President of the University of Chicago. (As a Chicago graduate, I almost reversed the order of these two distinguishing characteristics).

The published lectures are models of clarity and conciseness and can be recommended without reservation to the non-professional who wishes to obtain an overall view of modern genetics. In his three lectures, Professor Beadle discusses the history of genetic thought, the molecular basis of genetic transfer, and the significance of these findings in evolution, health, and the welfare of man.

The material presented is as up to date as is possible in a rapidly advancing science and should form the basis for understanding modern trends in genetics. Professor Beadle has done an outstanding job.

Richard M. Klein

ANCIENT PLANTS AND THE WORLD THEY LIVED IN. Andrews, Jr., Henry N. 279 pages, illustrated, indexed. Cornell University Press, Ithaca, New York. 1964. $5.75.

A reissue of this volume, seventeen years after its first publication, speaks well for its demand and popularity. It is only regrettable that the author did not revise a few weaknesses of the earlier edition, especially in view of his recent publication of a text, *Studies in Paleobotany*, 1961. Incorporation of several important discoveries during the past decade would have brought the volume up to date. The book, nevertheless, fills a need in that it serves to introduce the reader, who is not acquainted with fossil botany, to a stimulating experience. A brief introduction to the processes of fossilization and to the meaning and interpretation of fossil plants, in reference to plant evolution, is followed by well-illustrated discussions on ferns, on the giant lycopods or clubmosses (*Lepidodendron, Sigillaria*), and the scouring rushes or horsetails (*Calamites*). Our ancient coal forests are resurrected, the seedferns, cycads, ginkgoes, and conifers in general with special reference to the sequoias are treated. As in most books on this subject, including recent texts, the Angiosperms are almost neglected. This omission becomes increasingly disturbing since the ancestors of our flowering plants are an integral, historical part of their phylogenies. A correlation of the fossil record with modern plants would yield fascinating rewards in the collections for the entire Tertiary period, and the field of paleobotany would assume a more meaningful and satisfying aspect. A historical review of paleobotany is well chosen and treated. The numerous illustrations are pertinent in their fossil and living comparative aspects. A brief chapter is presented for those entirely unacquainted with the most elementary leaf and wood anatomy. Except for seven addenda, references do not extend beyond 1945, resulting in an omission of some of the most important literature during the past two decades. The index contains scientific aspects and names as well as common names.

Herman F. Becker

PLANT VIRUSES AND VIRUS DISEASES, FOURTH EDITION. Bawden, F. C. 361 pages, illustrated, indexed. The Ronald Press Company, New York. 1964. $8.75.

This revision of what has come to be the basic work in plant virology has been long awaited and much needed. Developments in the

field of plant virology have occurred at such a rapid rate, particularly in the last few years, that a complete rewriting and reinterpreting of the material contained in many of the chapters was necessary. Bawden has done an excellent job, and, as was the case in the previous editions, has correlated and evaluated the material in such a way as to give the reader a good overall comprehension of practically all areas of plant virology.

The general arrangement of the book is similar to that of the earlier editions, but chapters dealing with material of recent research interest have been added or expanded. "How to do it" chapters, present in the earlier editions, such as those on serology, virus purification, and estimation of particle sizes have been included, in part, in chapters dealing with virus assay, composition, and morphology. This seems to be a valid change, as several books or review articles on specific methodology are now readily available and are cited by the author. A chapter on virus multiplication has been added. This, in particular, was much needed, as practically all of the work on protein synthesis and infectivity of nucleic acid was done after the publication of the third edition. The chapter on insect transmission has been extensively revised in view of new concepts of virus-vector relationships.

T. P. Pirone, Associate Professor,
Louisiana State University,
Baton Rouge, La.

NEWS AND NOTES (Continued from page 204)

the development of fine sweet peas are the Bijou and Galaxy hybrids—the former being bush sweet peas which grow without support, the latter conventional climbers with seven to nine large flowers to a stem in all the lovely sweet pea colors.

Mr. Burpee has also received the 1964 American Home Achievement Medal "for his constant effort, over many years, to improve the quality of annual flowers—notably marigolds, zinnias, snapdragons, and petunias, and for his successful activities which have served to dramatize the seed industry and to bring flowers and gardening to the public's attention." The presentation was made by Hubbard H. Cobb, Editor of *The American Home,* in the "Golden Rodelle" marigold garden of the Johnson's Wax pavilion at the World's Fair.

Homer L. Jacobs, who retired recently as Vice-President for Research and Development of the Davey Tree Expert Company, Kent, Ohio, has joined the staff of Holden Arboretum as Consulting Arborist. He will be available for technical advice to the public as well as to staff members of the Arboretum, will lecture and conduct classes, and organize the photograph file on plants.

The Pennsylvania Horticultural Society will move its headquarters to 325 Walnut Street, in Independence National Historical Park, Philadelphia, this month, September, 1964.

The Society will occupy a complex of three early nineteenth-century buildings with the Philadelphia Society for Promoting Agriculture. The latter organization, the forerunner of what is now the Department of Agriculture, has been cooperating with the Pennsylvania Horticultural Society in setting up the new headquarters.

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The buildings, for which the 137-year-old non-profit Society will pay a nominal rent, are being restored by the National Parks Service.

Commenting on the importance of its new headquarters, R. Gwynne Stout, the Society's President, said: "The hundreds of thousands of visitors to Independence National Historic Park will become acquainted with the Society and the many services it offers. Our objective of promoting more and better horticulture among individuals and groups will be enhanced greatly."

The Hudson Valley Laboratory of the New York State Agricultural Experiment Station was dedicated in Highland on July 29, 1964. The laboratory has been in existence since the early 1920's, but the school house in Poughkeepsie, used for physical facilities, burned in February, 1962.

Because the laboratory had proved its value to growers in eastern New York, the Hudson Valley Agricultural Research Corporation agreed to build a new laboratory which, in turn, would be leased to Cornell University. To give the laboratory even greater impetus as far as its research program is concerned, Cornell University bought enough additional acreage adjoining the building site for establishing experimental orchards.

The Hudson Valley Laboratory of the New York State Agricultural Experiment Station is a basic link between New York's research activities in agriculture and those growers who produce their crops primarily for the fresh fruit and vegetable market. In the Hudson Valley, apples, peaches, pears, sweet and sour cherries, plums and prunes, and sweet corn are the basic fruit and vegetable commodities. Apples lead the group with an annual production of more than six million bushels. Some of the major accomplishments of the laboratory include the development of better control methods for insects and disease which ravish the ten thousand acres of sweet corn grown in the Hudson Valley. Research has also brought about directions for accurate timing and formulation of apple thinning sprays to the consumer with quality fruit. It is largely the result of spray thinning that has made 'Golden Delicious' such a popular variety in this part of New York State.

Many problems are yet unsolved. Virus diseases still cause twenty per cent of the losses in peaches, fifty per cent of the losses in sour cherries, and fifteen per cent of the losses in sweet cherries.

Three insects do most of the damage to crops in the Hudson Valley. They are the plum curculio, a pest of all tree fruits; the codling moth, which primarily damages apples; and the apple maggot.

"It is essential that the New York State Agricultural Experiment Station maintain a laboratory dedicated to solving the problems peculiar to the needs of growers in the Hudson Valley Region," said D. W. Barton, Director. "These new facilities should enable us to provide an even greater service."

Insects vs. Man. Insects are more numerous than all other kinds of animals combined, re-

An aged American holly, *Ilex opaca*, in Pamlico County, North Carolina.

ports Walter L. Haldeman, Office of Correspondence Courses of the Pennsylvania State University. About fifteen thousand species can be found in an average locality. But because of sheer numbers are insects a real threat to human life? Or can natural and man-made controls keep their numbers down?

Answers to these questions are discussed in Penn State's correspondence course, "Principles in Insect Control." It is pointed out that only comparatively few kinds of insects are man's enemies. However, the total damage done by the "harmful" species exceeds five billion dollars in United States. These costs are twofold: 1) losses in decreased crop yields, stored food and fabric damage; 2) spraying and fumigation.

Is it wrong to use poisonous chemicals as insecticides? The answer is not clear-cut, but one can learn about insect control from Penn State correspondence course by sending name and address with $3.00 to Insect Control, Box 5000, University Park, Pennsylvania.

The Holly Society of America has located what is considered to be the oldest specimen of American holly *(Ilex opaca)*. The tree is two hundred and two years old, according to the North Carolina Department of Forestry, in all probability the oldest and largest in the United States. Its measurements are 41.9" diameter at four feet above ground; 20.95" radius at the same point. The trunk is rugged and stout for about eight feet before it branches.

This large holly is located in Pamlico County, North Carolina, about three miles north of the Colonial Governor's Palace in New Bern which has been beautifully restored within recent years. The site on which this venerable American holly stands will be developed into an arboretum for ornamental species and varieties of *Ilex* by the North Carolina State College under Dr. Fred Cochran, Head of the Department of Horticultural Science. A grafted scion of the tree will be grown there to perpetuate the strain of this magnificent specimen.

Jackson M. Batchelor, President of the Holly Society of America, has appointed a committee to determine if there are older and larger trees of *Ilex opaca* in this country. Information on estimated age, diameter, height, spread, etc., as well as location, should be sent to the chairman of this Committee, C. R. Wolfe of Millville, New Jersey.

The New Jersey Audubon Society will conduct a Natural History Conference as part of the year-long celebration of the three-hundredth anniversary of the founding of the State of New Jersey. A series of scientific papers will be given in four sessions in the City Hall Auditorium at Cape May, beginning at 10:00 a.m., October 1, 1964, and continuing through October 2. The papers will cover phases of natural history and conservation—botany, geology, ornithology, and zoology.

The conference will be followed by the annual fall nature weekend of the Society with nature walks, caravan trips, and two fine natural history films by Allan D. Cruikshank of the National Audubon Society.

Further details of the program may be obtained from the New Jersey Audubon Society, 790 Ewing Avenue, Franklin Lakes, New Jersey.

Maximino Martinez

Mexican botany lost a warm, perceptive, and tireless worker—one of its most productive lives—with the death on June 2, 1964, of Maximino Martinez, at the age of seventy-six.

An investigator, teacher, and writer whose books include some of the basic works on Mexican plants, Dr. Martinez was the author of *Plantas Utiles de México* (1926), *Plantas Medicinales de México* (1933), and *Catalogo de Nombres Vulgares y Cientificos de Plantas Mexicanas* (1937), to list only the most widely known titles. He also wrote the definitive monograph on Mexican pines and the texts on botany and zoology standard in Mexican schools.

Dr. Martinez was the founder, in 1941, of the Sociedad Botánica de México and served as its permanent secretary until his death. He also formed the Sociedad de Amigos del Herbario, which helped him to improve the national herbarium and obtain the metal cases in which the specimens are now kept.

Maximino Martinez was born on May 30, 1888, in Regla, Hidalgo, and was brought up in Pachuca, capital of the same state, where he attended primary schools. He received his teaching degree from the Escuela Normal de México in 1913 and pursued specialized studies in zoology and English. He was given a degree of Doctor Honoris Causa by the Universidad Latino Americano of Havana, Cuba, in 1954—an honor which, with typical modesty, he kept to himself. It became known only shortly before his death.

He taught in primary schools of the Federal District from 1910-20, the years of the revolution. During most of the same period, he also served, from 1914-19, as head of the botanical section of the Museo Historia Natural—a double-duty arrangement he had most of his professional life.

Dr. Martinez first entered service of the National University as professor of biological science in the preparatory school in 1920 and served in that capacity until 1930, when he left to take various commissions and posts, also in biology. As part of this work, he traveled to Europe and the United States to assist at Botanical Congresses, study natural science teaching methods, and visit the principal herbaria. In 1944, he reentered the University in the Biological Institute as a research associate.

"His colleagues," in the words of Dr. Helia Bravo, a member of the National University botany staff, "admired Professor Martinez for his indefatigable labor. At the age of seventy-six, he still arrived at the Institute punctually at 9 a.m., after a trip by bus and on foot, closeted himself in his cubicle to work and only left to take light refreshment, working daily until 6 p.m. All marveled at his clear intelligence, his amazing memory, the full vigor of his head and hands—his handwriting still elegant and firm and his drawings perfect. Only his body weakened from his last illness, but it did not prevent him from assisting at the Institute until the day he died."

Members of the foreign communities of Mexico remember him as a man always ready to answer their questions about plants, modestly hesitant to use his good English, and eager to show newcomers how to use the Institute's library or herbarium. In addition to Spanish and English, Dr. Martinez also spoke French and German, and some Russian, Italian, and Portugese.

He is survived by a son, Jesús, who is an illustrator, and four grandchildren.

Burial was on June 3, 1964, at the Panteón Jardín in Mexico City. Colleagues, students, and friends of Dr. Martinez and members of the Botanical Society gathered for a graveside discurso given by Ing. Efraim Hernandez Xolocotzin, President of the Botanical Society and Head of the Department of Botany at Chapingo Agricultural College.

Phil Clark

The gremlins caught up with us, alas. On page 155 of the July-August issue, under Bulbs and Perennials, two words were omitted, *betonicifolia* and *Echinops*. The second line under this heading should read: *Meconopsis betonicifolia* and *Echinops ritro*, not *Meconopsis ritro*. On page 152, the caption under the third photo at top should read spotted knapweed, as it appears on page 154, and not spotted knotweed.

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We were delighted to welcome the following new members between March 31, 1964 and June 30, 1964.

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THE AMERICAN HORTICULTURAL CONGRESS

Program

SEPTEMBER 29

2 - 5 p.m.	Registration, Windsor Lobby, Hotel Commodore, New York.
3 - 3:30 p.m.	Directors' Meeting.
5:00 p.m.	Hospitality Party by Mr. and Mrs. Roger Glenn Mook. Windsor Terrace.
7:00 p.m.	Garden Writers' Association Dinner, West Ballroom.
8:30 p.m.	First American Horticultural Film Festival.

SEPTEMBER 30 — American Horticultural Society Day at The New York World's Fair.

9 a.m. 1 p.m.	Registration, Windsor Lobby.
7:30 a.m.	Garden Writers' Association Breakfast.
9:00 a.m.	Buses leave for Queens Botanical Garden and World's Fair.
11:30 a.m.	Luncheon at Indonesian Theater Restaurant.
	Presentation of Liberty Hyde Bailey Medal to Robert Moses.
4:00 p.m.	Cocktails and tea at Julimar Farm, as guests of Mrs. J. Phelps Revson.

OCTOBER 1

9 a.m. 4 p.m.	Registration, Windsor Lobby.
9:00 a.m.	Plenary Session. Windsor Ballroom.
10 a.m. 12:15 p.m.	Illustrated Lectures: "Low Maintenance Gardening and Plants Which Make It Possible" by Dr. Donald Wyman; "Gardening Indoors" by Ernesta Ballard: "Comparative Observations on Plant Collecting in Japan, Nepal, and the Soviet Union" by Dr. John L. Creech.
12:30 p.m.	Luncheon—Address of Welcome by Robert F. Wagner, Mayor of the City of New York. Illustrated talk on "Flowers through the Centuries" by Julia S. Berrall.
2:15 - 4:30 p.m.	Illustrated Lectures: "Review, View and Preview" by Dr. E. J. Duda; "Exploring the South African Ornamental Plant Frontiers" by Dr. Russel J. Seibert: "Asexual Propagation and Culture of Pelargoniums" by Dr. Darrell E. Walker.
4:30 p.m.	Directors' Meeting.
7:00 p.m.	Awards Dinner: Speaker, Dr. C. H. Hoffman on "Biological Control of Garden Insect Pests."

OCTOBER 2 — Congress Day at The New York Botanical Garden

9:15 a.m.	Visit Propagating Range, Conservatory. Montgomery Conifer Collection, Library, Herbarium, Research Laboratory, etc.
11:00 a.m.	Auditorium: Welcome—Dr. William C. Steere, Director; T. H. Everett—"The Educational Program"; Louis P. Politi—"Horticulture at the Garden"; Dr. P. P. Pirone—"The Garden and the Public".
12:30 p.m.	Box Luncheon.
1:30 p.m.	Auditorium: Dr. Arthur Cronquist—"Horticultural Importance of Taxonomy"; Dr. Annette Hervey—"Laboratory Research at the Garden"; Dr. Steere—Summary.
3:00 p.m.	Continue visit of grounds and facilities.
4:00 p.m.	Wine tasting—Fine Wines of California Association.
7:00 p.m.	President's Dinner, Windsor Ballroom. Speaker: Richard H. Pough on "Living Museum of American Flora".

OCTOBER 3

9:00 a.m.	Buses leave for tour of Old Westbury Garden, Bayard Cutting Arboretum, Planting Fields Arboretum, and John Hay Whitney Estate.
4:00 p.m.	Buses return to hotel.
4:00 p.m.	Annual Meeting of American Association of Botanical Gardens and Arboretums at Planting Fields; followed by dinner at Planting Fields.

Attendance at the Congress is not limited to members of the American Horticultural Society. Anyone interested in attending may communicate with Dr. Albert J. Irving, General Chairman, 9 Rockefeller Plaza, New York, regarding registration for all or part of the Congress.

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THE NEW YORK BOTANICAL GARDEN

Vol. 14, No. 6 November-December, 1964

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THE GARDEN JOURNAL

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SOME ENDURING FAVORITES

By CAROLYN S. MACKIE

Mrs. (David Ives) Mackie contributes articles to horticultural publications and lectures on the interesting and unusual plants she grows at her place in Far Hills, New Jersey. Mrs. Mackie is active in The Garden Club of America and the Horticultural Society of New York.

WHEN WE BOUGHT our present home ten years ago, it was a lonely little house just newly-built in the middle of an empty, seventeen-acre field, with no foundation shrubs, no shade trees, and not a shadow of any garden planting. Today, our house has lots of green company all around it—over seven hundred shrubs and trees, in fact—for my husband and I are avid collectors, and our hobby of growing as wide a variety as possible of flowering trees and shrubs seems to have no terminal points. Every year we see or hear of some new or unusual plant for which we long, and so I fear we shall never complete that continuous list of "Our Ten Most Wanted Trees or Shrubs!"

Our initial hope that our small arboretum would provide beauty and interest right around the calendar seems truly

The author's home ten years after the property had been acquired and planted.

to have become a reality, for no matter what season of the year it may be, we find something special to enjoy—flowers, fruit, berries, cones, texture of bark, or shape of branch. We plant our "treasures" in beds or "islands" with a varied assortment of trees, bushes, and ground cover in each, and as the years go by, more and more of these islands placed between winding grassy paths stretch out farther and farther into the fields. Today it takes several hours at a leisurely pace to visit and check each member of our ever-increasing horticultural family, but "the more the merrier" say we!

Being amateurs at the planting game we have, of course, made many mistakes as to where, when, and what we have planted, but experience is indeed the best teacher, and we have learned much from these mistakes. The icing on our cake has been the reward of seeing the "non-mistakes" thrive and flourish, apparently at home in our fields and happily sharing their beauty with us. Our geographic location in the middle-western section of New Jersey gives us a climate of rather wide extremes. In winter the thermometer goes to zero or a bit below at times, and we seem either to have too much snow or none at all of that precious "poor man's fertilizer." In summer we often suffer from protracted periods of high humidity and even higher temperatures, well into the 90s, with more often than not, heartbreakingly long stretches of drought. But in spite of these problems which are fortunately temporary, we love the yearly changes of season. The many exciting weeks of our beautiful spring and the many long and glorious days of our golden autumn make our climate not only palatable but distinctly pleasant for us, and for an amazingly wide variety of trees and shrubs too. Among these our list of favorites is a long one with some special pets for each season whose performance is always reliable and whose colorful display of flowers, fruit, or foliage we anticipate and enjoy with increasing pleasure every year. Brief descriptions of some of these follow, beginning with the dogwoods in early May.

These lovely trees are much at home in our area and besides the usual pink and white varieties four other members of this family are favorites of ours. First, a weeping white dogwood *(Cornus florida pendula)*, which in early spring always astounds visitors by its lavish display of bloom on

The Mackie's lath house in the fall.

branches drooping to the ground; second, the Japanese dogwood *(C. kousa)* which waits until June to show its myriad white blossoms and then in fall bears masses of small pink and red strawberry-like fruits; and lastly, two four- to five-foot shrub dogwoods *(C. alba sibirica argenteo-marginata* and *C. alba sibirica* 'Coral Beauty'), for the former's green and white variegated leaves look so cool and refreshing all summer and its blood-red stems give a fine spot of color in the winter landscape, as do also the more brilliant coral-red stems of the latter.

Redbuds or Judas trees with their magenta-pink blossoms are native to the woodland areas of our eastern states, but we much prefer the *white* redbud *(Cercis canadensis alba),* surely one of the most beautiful flowering trees there is. With every branch wreathed in clusters of white sweet pea-like flowers it is always a breath-taking sight in early spring, especially if planted in front of tall green conifers against which not only its flowers but later its pretty heart-shaped leaves make such a pleasing contrast.

Another May-flowering tree of great loveliness, and seemingly easy to grow, is the flowering ash *(Fraxinus ornus)* with its panicled profusion of creamy-white flowers, which are linear or threadlike, somewhat similar to the feathery masses of white blooms produced a month later by another favorite, the fringe-tree *(Chionanthus virginica).* Furthermore the flowering ash gives us a double reward, for its flowers are not only beautiful but also deliciously fragrant. This is a happy choice to plant near one's house.

Without any question springtime's most exciting flower show for us comes when the *Daphne* 'Burkwoodii' opens its multitudinous rosy buds and generously exhales the unbelievably sweet perfume. We planted two of these shrubs on the south side of our living room in front of a large floor-level window so they are in full view from both inside and out. When we set them there in 1954, they were but eighteen inches tall with a modest width of only twelve inches. Today, ten years later, they are three and four feet tall with a very unmodest breadth of nine and ten feet, respectively. Completely hardy, these shrubs bloom from a full ten days to more than two weeks in early May, and the deep pink color of their buds gradually turns to white, as their heavily perfumed flowers open wide. These long-blooming daphnes annually provide the high point of springtime beauty and fragrance for us.

Of two June-flowering trees, whose blooms resemble the long, pendulous racemes of the familiar wisteria vine, the first is the golden-chain tree *(Laburnum watereri).* Its common name aptly describes its many hanging clusters of golden-yellow flowers—they literally cover the tree in a blaze of sunshine. Since this tree grows only to about thirty feet and is fastigiate in habit, holding its branches stiffly upright rather than spreading outwards, we have found it excellent for a restricted area or small garden corner. The second wisteria-like bloomer is the American yellow-wood *(Cladrastis lutea),* a tree growing to about fifty feet with heavy panicles of delightfully fragrant, white blossoms. Though not a reliable bloomer every year, it puts on such a magnificent show when it does flower that we are amply rewarded for the waiting.

July brings us the enchanting pink "powder puff" blossoms of the silk-tree *(Albizzia julibrissin rosea),* whose delicate perfume is more noticeable in the shades of early evening than in the hot sunshine of mid-day. These unique feathery blooms, ranging in tone from almost white to deep rose, continue unfolding until late August and often into September, thus furnishing a wonderfully long period of bright bloom during those summer months when the majority of trees are clothed simply in green. Interesting too, is its tropical-looking, lacy foliage which closes at sundown like that of the sensitive plant when you touch it. Albizzias are proving hardy farther and farther north, they do especially well at the seashore, and are very drought-resistant —three additional points for recommending them.

Another lovely summer bloomer is the sorrel-tree or sourwood *(Oxydendrum arboreum),* whose terminal clusters of white flowers, closely resembling lilies-of-the-valley, also open in July. These blossoms change almost imperceptively into seed pods which, even when dry and hard, still resemble flowers and remain on the tree all fall, even after the leaves have turned to glorious shades of deep red and carmine, thus giving the effect of continuing its bloom throughout the autumn.

Daphne 'Burkwoodii' furnishes a perfumed floral display in May.

Cercis canadensis alba.

One of the most enjoyable periods of summer begins for us when the four-inch, white spikes of the summersweet or pepperbush *(Clethra alnifolia)* start to bloom in late July and, like the albizzia, often continue well into September. We prefer the pink-flowering form of this lovely bush *(C. alnifolia rosea),* a clear apple-blossom-rose color; but whether pink or white, this shrub is famous for its heady and pervasive fragrance and also for its easy adaptability. A native of our eastern states, it seems to grow as well along the coast as inland, and it thrives both in semishade and in full sunlight.

It is difficult to choose just one or two favorite shrubs or trees from among the many whose brilliant berries or colorful foliage we enjoy each fall; but several of the cotoneasters certainly fall into this category, especially the low-growing "cranberry" cotoneaster *(C. apiculata)* with its extra-large, bright red berries, and the tall, spreading, willow-leaf cotoneaster *(C. salicifolia),* whose smaller, red berries come in hanging clusters and whose narrow leaves turn a deep wine-red color and remain on the bush all winter. The mountain-ash trees *(Sorbus aucuparia)* are fall favorites, too, and have been reliable performers, giving us clusters of white blossoms in the spring and bright orange fruit in the autumn. Some years they have been so heavily loaded with fruit, their branches have swept the ground and we feared they might break. But always as the fruit ripens the birds, with obvious relish, gradually relieve the trees of this precious weight.

Salix matsudena tortuosa.

Then in late fall just when we think that surely the very last flower of the year has faded away, we are annually delighted to see our autumn Higan cherry tree *(Prunus subhirtella autumnalis)* put on a repeat performance of its spring show of tiny, double, pale pink flowers. Delicate and beautiful, and surprising to see at this time of year, they seem to be an extra dividend from generous Mother Nature.

In winter several shrubs and trees reveal a special beauty hardly noticed the rest of the year when covered by their thick green foliage. The curlicue branches of the Hankow or corkscrew willow *(Salix matsudena tortuosa)* and the equally twisted ones of that famous shrub, the "Harry Lauder's walking stick" *(Corylus avellana contorta)* make fascinating silhouettes against a cold blue wintery sky, especially when silvery white, touched by a bit of frost or snow. Now too the unusual pealing bark of the paperbark maple *(Acer griseum)* shows its contrasting colors of mahogany, cherry-red, and speckled brown, and during winter months our eyes are caught by the lovely mottled gray-green patterns of the bark of the Oriental and London plane trees *(Platanus orientalis* and *P. acerifolia).* In winter we enjoy not only the many cones of our evergreens but also the seed pods which remain on the branches of many deciduous shrubs and trees. We enjoy a second gift from the pearlbush *(Exochorda racemosa)* for besides giving us lovely white flowers in spring, its exquisite seed pods, like tiny, dark brown stars, now stand out along its bare branches, remaining on all winter and adding great interest to the shrub border. Similarly the many delicate gray catkins hanging from the branches of the beautiful purpleleaf hazelnut *(Corylus maxima purpurea),* and the dancing winged sa-

Corylus avellana contorta.

maras of the little Amur maple tree *(Acer ginnala)* add a decorative note to the barren winter scene.

The aforementioned are but a few among the many favorite trees and shrubs which have particularly endeared themselves to us during the past ten years because of their hardiness-dependability, or their climate-adaptability, their disease-resistance, the glory of their fragrances, or perhaps simply because of their beauty. I'm sure in future years more favorites will emerge from our newly planted islands, but I doubt if they will ever completely replace in our affection those I have just mentioned. For these are well-loved friends, both tried and true. How better to express my feelings about them than to quote these charming lines penned back in the nineteenth century by Dinah Marie Mulock Craik, a lady who must have been an ardent and a loving gardener for she wrote;

"I love, I love them so—my green things growing!
And I think that they love me, without false showing;
For by many a tender touch, they comfort me so much,
With the soft mute comfort of green things growing."

Fraxinus ornus.

HOLLY AS LANDSCAPE MATERIAL

By CLARE R. STEVENS

Mrs. (Byam K.) Stevens kept up her interest in horticulture, which was stimulated by a course in landscape gardening at Columbia University under Professor Hugh Findlay in 1935, until she had the opportunity to practice on a larger scale when she and Mr. Stevens moved to Maryland in 1940. "Holly Hedge Nursery" was spawned in the late 1940's and continued to grow until it was sold three years ago. During these years Mrs. Stevens did considerable landscape consulting and lectured before garden clubs.

IT IS A REVELATION to many people to learn that there are hundreds of varieties of hollies. To most people, holly brings to mind the beautiful arrangements of green holly with red berries, as part of Christmas tradition. However, when one looks beyond the Christmas season, he finds that holly has splendors to offer throughout the year and provides unlimited possibilities for landscape material.

There is a holly for every garden requirement. At present, well over three hundred species and varieties from national and world-wide sources are authentically listed, with new ones constantly being added, as a result of knowledgable and patient propagation.

Low-growing *Ilex crenata rotundifolia* makes a superb hedge.

There are hollies which attain every size from a small-leaved ground cover to a large-leaved, lofty specimen. Some are narrow and erect, others are spreading. Some are openly branched, others are dense and compact. Some grow to be excellent material for topiary work—conical, pyramidal, or columnar. There is also wide variation in leaf form and texture, for there are hollies with big leaves, small leaves, spiny leaves and smooth leaves—an infinite variety of choice for the palette of the designer of a garden.

First, and most important of all, is the drawing up of an over-all garden plan; for whether your garden is a wee cozy one, or an estate on a large scale. you will be creating a picture with living plants. The picture is a composition of mass, color, careful balance, and proper scale. It is essential to make a study of the plant material you plan to use, to fulfill all the component elements which lead to a successful result. For this study, I put holly at the top of the list, because of its versatility. Holly can stand alone as a specimen, may be planted in a bold group, or interspersed with other evergreens with equal success.

FOUNDATION PLANTING is closely related to the architectural plan. Therefore, the choice of hollies for the foundation planting will depend on the character of the house.

A holly at either side of the front door is most inviting. Tall hollies at the ends of the house provide an outer frame. There are medium-sized hollies for the intervening locations, including such species as *Ilex aquifolium, I. bur-*

English and American hollies, *Ilex aquifolium* and *I. opaca*, are featured at Holly Acres, West Falmouth, Massachusetts.

fordii, I. pernyi, I. opaca, and *I. cornuta.* Variegated forms provide variation of color among the green hollies. Variegated hollies should be planted close to the house, as the yellow fades into the distance and loses its ornamental value. Do look, too, for a low, spreading holly to put under a low window.

A special word of caution in regard to foundation planting—don't overplant! Almost everyone does, and then is reluctant to thin out. It is vitally important to know the habit, final height, and width of each holly you are planting, in order to allow for future development. These are questions to ask the nurseryman; otherwise, you may take home a tiny holly in a pot, only to have it surprise you by growing into a tree in front of your living-room window!

Ilex latifolia has grown into a fine specimen against the wall of Mrs. F. Leighton Meserve's home at Holly-by-Golly, St. James, Long Island.

Ilex pernyi in the foreground; immediately in back of it, *I. aquifolium, I. cornuta,* and *I. crenata;* and in the far background, several specimens of *I. aquifolium* at Holly-by-Golly.

A very old specimen of *Ilex opaca*, indigenous to Queen Anne's County, on the Kenworthy Place in Centerville, Maryland.

The original planting may look sparse, if it is correctly designed. One way to avoid the pitfalls of overplanting is to mark the plant location with a stake, and then circle it with a hose, or any line, which will give you a mental picture of where the final growth line will be. In the intervening space, smaller hollies in wire baskets may be planted and enjoyed until the permanent plants have attained their growth. The hollies in baskets may then be lifted and planted in other locations.

SPECIMEN HOLLIES are ideal to define the gateway, or entrance, of a property. The character of the hollies selected is governed by the formality or informality of the entrance. A pair of hollies will suffice for a natural entrance. More hollies may be added, in a continual planting along a brick wall or wooden fence, extending on either side of the entrance.

Plant a holly near the house to give a feeling of welcome. Place it where the sun's rays will reflect the color of the berries and heighten the brilliance of the leaves by day, and where the headlights of your car will light up their beauty at night. What could be more beautiful than this holly framed against the snow in winter time? Plant a favorite holly where you will see it when looking out of the windows of your house. This is important for much time is spent indoors looking out!

HOLLY HEDGES are excellent; witness their wide use in the restoration of Colonial Williamsburg. When planting a hedge, use only one variety, and be sure that it is a reliable variety. For tall hedges, substantial varieties of *Ilex aquifolium, I. opaca,* or *I. cornuta* are good choices. Hedges are useful to define boundary lines, to provide privacy, to serve as a windbreak for your garden. Birds love these hedges as nesting sites. Holly hedges may be sheared, or not, according to preference.

A low edging of holly around the outer side of the driveway, where it curves in front of the house, creates a lovely framework for the front door. Try one of the *I. crenata* varieties—*helleri, rotunda, rotundifolia,* or *hetsi* for this effect.

Hollies also lend themselves to espaliering and make a colorful display against a northern house or garden wall.

One most important fact: holly trees are dioecious, that is, there are male and female trees. The female carries the berries, the male the pollinating blossoms. There must be a male, then, to pollinate females and cause the berries to be plentiful. A small male bush is adequate and will pollinate many females, provided they are in a bee-line of flight. This means a male plant on either side of the house.

All hollies will be denser, more vigorous, and more attractive if pruned regularly once a year. This cutting back of branches forces adventitious buds to grow, creating a fuller, bushier tree, with more abundant fruit. Most people prefer to do this pruning at Christmas time, but don't wait for this annual pruning, necessarily. Whenever you see a leggy branch growing out of line, don't let it continue to get out of hand—whip our your pruning shears and lop it off. This clipping actually benefits the plant, keeps it in good shape, and provides the flower arranger of the house with holly branches throughout the year.

No property is too large, and none too small for holly planting. Once you appreciate their value, you will always be on the hunt for new varieties of hollies to increase the overall beauty of your landscape picture. The search is exciting and rewarding, for the present, and for the future!

For those wishing to make a further study of holly, I recommend *Hollies,* by H. Harold Hume, Growing Evergreen Hollies, by H. Gleason Mattoon, and *Handbook of Hollies.* The last is obtainable from The American Horticultural Society.

I also suggest joining the Holly Society of America. Information may be had by writing to the Secretary, whose address is Bergner Mansion, Gwyn Falls Park, Baltimore 16, Maryland.

This Maryland dwarf spreading holly is a beautiful female *Ilex opaca*, which never grows taller than three feet.

What is more cheerful, in this time of year, than an open wood fire? Do you hear those little chirps and twitters coming out of that piece of applewood? Those are the ghosts of robins and bluebirds that sing upon the boughs when it was in blossom last spring. In summer whole flocks of them were flittering about the fruit trees under the windows; so I have singing birds all the year.

THOMAS BAILEY ALDRICH

THE CHALLENGE OF HORTICULTURE AND CLIMATE IN THE CHICAGO AREA

By ALBERT S. ROUFFA

Dr. Rouffa, who is a botanist and Professor in the Department of Biological Sciences at the Chicago campus of the University of Illinois, has been an active participant in the horticulture of northeastern Illinois. He has supervised testing of woody ornamentals at the University's Experiment Station outside of Chicago and at his home in Downers Grove. Having resided in New England and northern New Jersey, he has asquired a perspective in the gardening requirements of the East Coast and of the northern Midwest.

DURING THE MIDDLE YEARS of the nineteenth century Will Carleton, a novelist, took a look at the very young and intensely vital city of Chicago. What he saw prompted him to crown it euphoniously as ". . . the Queen of the North and of the West." Our present image of what constitutes the "West" has long since changed, thanks to Buffalo Bill Cody and his spiritual descendants in Hollywood. It is also certain that Sandburg's masculine image of the "hog butcher to the world" has become a rather dated item in deference to the rapidly changing techniques of meat processing, merchandizing, and distribution. Nevertheless, the lyrical sobriquet of "Queen" might yet be fitting, provided one were to accept the qualities of mercurial change—between loving-kindness and whimsical caprice, between the offering of overflowing bounty on the one hand and of wretched scarcity on the other—as queenlike.

In this instance, I do not speak of the people of this city nor of the image they create, for many books have been written on this subject. Rather, I refer to the land and climatic region in which these people live and work, and of the environment afforded by this land to the other living things, plant and animal, which also find their home here. Even after a century, much of this region and its climate still offer a pioneering challenge. Certainly, a correct interpretation of the climatic situation in northeastern Illinois has been needed for a long time. And if I were to take into consideration the well-established relationship between climate and plant growth, particularly with regard to water availability, such an interpretation could very well serve as a jumping-off point for a better usage of plants in the large Chicago urban-suburban complex.

The average gardening and landscaping home owner becomes an unwitting victim of circumstances, many of which, as we shall see, are within his control. Some attention might be paid to those who have earned their gardening apprenticeship somewhere along the East Coast and, for one reason or another, have pulled up stakes to become established in the Chicago area.

At this junction I should add some measure of reassurance for those who have left the gardener's "Good-Life" in the East for a new start in this region. At first the newcomer will probably not notice any significant differences—depending upon what season his arrival occurs and perhaps upon the landscape of the area from which he came. I can recall leaving a drought-parched northern New Jersey in the late 1940's and driving through into a cool, green Chicago; but immediate impressions such as this are misleading. A little more openness to the landscape may be apparent at the start, but this impression (a very valid one I might add) fades with familiarity more often than not. Nevertheless, after several seasons the new midwestern gardener will have begun to experience the challenges so inherent in this region, and will soon learn to look before leaping. Most likely, he will discover that one must garden more intelligently than heretofore. Our neophyte will eventually be fortified by the realization that there are reasonable solutions to most of the problems encountered. Also, for anyone who wishes to take the time, an historical perspective of this region might prove helpful.

A typical long-grass prairie in late summer. Although common more than a century ago in northeastern Illinois, such prairies are not to be found in the Chicago area today. This one exists in southern Minnesota, not too far from Minneapolis.

During the eighteenth and nineteenth centuries, when the first traders moved into what is now northeastern Illinois, much of what is now the city of Chicago and its near suburbs was swampland barely drained by the several branches of the Chicago River. Indeed, the closeness of the water table to the surface was all too apparent in the early accounts of rain-mired streets in the young and bustling city, and a standing joke among newcomers was the almost complete scarcity of basements in Chicago homes. Long and persistent effort was required to raise the street levels above the hazard of standing water. Much of the lake front was occupied by low sand dunes on the west shore of Lake Michigan, which gradually increased in height along the south and east shores. The northern Indiana and southwestern Michigan dunes can still be seen as small hills from a distance of several miles. The west-shore dunes were covered in part by black oak woodlands as are some of the present dune areas of northern Indiana and southwestern Michigan. Away from the lake stretched the seemingly endless Illinois prairie, a sea of high grass and other herbaceous plant life growing in a dark, heavy soil and abounding in game of all sorts; high enough, it is said, to have hidden a man on horseback at certain times of the year.

Virtually all this original prairie has long since disappeared, but historically minded ecologists have charted its boundaries and refer to the Illinois section as the "prairie wedge," or "prairie peninsula," an eastern extension of the even more vast long-grass prairies west of the Mississippi River—and which, incidentally, gave evidence of having a more easterly extension in much earlier times into Ohio and western Pennsylvania. Not all of the lands away from the future city of Chicago were entirely covered with prairie, however, for there were many scattered and sometimes extensive places where well-developed and often rich woodlands could be found. These cool woodlands, we can be sure, provided a measure of comfort and relief to the early settlers. Nevertheless, the predominance of prairie was a striking feature of the landscape away from the lake. Although gone from the gaze and memory of man, the ghost of the prairie still lives on in the persistence of prairie grasses and herbs in abandoned fields (sometimes called "prairies" by latter-day Chicagoans), in roadsides and railroad rights-of-way, and especially in the insidious climatic conditions which, along with Indian game-herding fires, maintained and preserved the ancient prairie. *It is this latter ghost which haunts the would-be gardener or landscaper who willfully attempts to bring in an alien landscape.*

We now know that the prairie was not the same throughout. Indeed, the kinds of herbs and grasses which lived in the low or more persistently moist spots were rather different from those which occurred in the higher and drier aspects of the grassland. The early settlers almost consistently chose the best-drained lands for their farms. Because the eastern immigrant felt more at home where there were trees, the woodlands or edges of the woodlands were first to be chosen. Next to be occupied, after these areas were abandoned by the Indians fleeing westward and sod-breaking plows became available, were the well-drained or "high prairies." The latter eventually proved to be among the most productive farms in the world. When feasible to drain by ditch or tile, the "low prairies" were settled. Otherwise, some of the worst-drained sections surrounding the city—and these included sloughs or shallow ponds which become dry during the summer months—awaited the settlement of the suburban areas during the land-boom of the twenties and the accelerated settlement of these suburbs after World-War II. Houses and even neighborhoods were unscrupulously or, at best, foolishly developed in these low spots—to the dismay of many a hapless present-day householder who has found his house an island in a shallow lake after a heavy rain and hardly within sight of a stream. Much of this soggy disaster results from the physical structure of a heavy clay subsoil (an heritage from the ice-age lake) which at times becomes highly impervious to water percolation.

A home owners' survey in present-day Chicago suburbia would reveal that the original woodland areas, if fairly well drained (and some are not), command a high price. Consequently, some of the finest and most exclusive homes are to be found in the wooded areas of the north-shore communities and in the many woodland openings of the original and vanished prairie. The remainder of the suburban

An abandoned field near the edge of an oak woodland in a far south suburb of Chicago. Both field (present-day "prairie") and woodland belong to the Cook County Forest Preserve District.

A view of Lake Michigan from the Indiana Dunes State Park.

home owners, from aspiring junior-executives to blue-collar workers, content or frustrate themselves, as their natural humor dictates, upon converted farmland subdivisions taken from prairie and still retaining initially a treeless, sunbaked, and wind-exposed aspect. An Oklahoman who settled in a northwestern suburb is, I am told, very content with his open location. However, having spent my earlier years in New England, I soon became restless with my purchased heritage and, after twelve years of effort and monumental waiting, teased the land into boasting of trees and usable shade, and even such unheard of things as rhododendrons and azaleas, a bald-cypress and a metasequoia. But it is a never-ending battle, because the Prairie Maker always rushes in when one's guard is down.

We are, as I shall elaborate below, in a climatic and soil region almost midway between that which produces pure woodland in non-disturbed areas and that which produces grassland. I should like to stress an acquired midwestern optimism which reiterates, regardless of losses, that whatever one wishes to grow, one can often achieve. But, at least for some things, not without the challenge of considerable effort.

Briefly, what are some of the climatic problems in northeastern Illinois which are so limiting to horticulture. The first, and probably by far the most important, is the *erratic distribution of natural precipitation.* In plain language, it does not rain (or snow) often enough, or in the proper amounts, or at the right time, to maintain adequate supplies of soil moisture during critical periods of plant growth (particularly of woody plants). The generally heavy clay-loams away from the lake shore are highly water retentive, and this is a saving grace on the whole. However, when dried out after four or more weeks without rain, these soils tend to become initially impervious to water. Consequently, short showers of low precipitation often accomplish nothing, and heavy rains often run off an inordinate amount of water which never becomes available to plant roots, especially the deep roots. Also, the periods of highest precipitation coincide quite often with periods of high temperature and excessive evaporation.

The mean total annual rainfall has been measured between thirty-three and thirty-five inches, depending on location. In other regions this might supply adequate amounts of soil moisture, and climatologists generally classify our climate, "moderately humid." According to the Weather Bureau publication. *Climatic Guide for Chicago, Illinois Area* (No. 40-11), "Precipitation in measurable amount falls on the average during one day out of three and is spread throughout the year." Unfortunately, a quantity of 0.1″ is measurable to weather-bureau techniques, but is hardly sufficient to penetrate a tiny fraction of an inch of bone-dry clay-loam. It is entirely possible to average one inch of rain per week and have it fall in such small quantities as to barely penetrate into the topmost layer of the root zone, out of reach of most woody and many herbaceous plants. Winter precipitation is quite low and more often than not either comes in the form of snow when the ground is frozen and evaporates before the ground thaws, or it is merely sparse on the average throughout the years. Precipitation records from many stations in the city and surrounding areas indicate some diversity. However, one fact stands out: the highest mean precipitation (around four inches) occurs in May or June, and then falls off quite rapidly through the summer, fall, and winter. A very slight and highly erratic precipitation rise occurs in September and October. Temperature records indicate that the average temperature rises rapidly from 60° in May to 70° in June and to a high of about 75° in July when rainfall is on the decrease. Much of the rainfall in these months is not the slow, gentle, eventually penetrating kind, but the short, heavy cloudburst. Run-off and evaporation take a heavy toll of the water supplied by the latter form of precipitation and, since the fall and winter supply is usually inadequate, the situation often becomes critical. Indeed, much of northeastern Illinois is constantly teetering on the brink between adequate and inadequate soil water supply, and at a time (summer and fall) when the water loss is at its greatest because of evaporation from the soil surface or transpiration through plants from the soil depths.

Another problem to be reckoned with is the winter temperature extremes. Typically midwestern, the Chicago area winters are neither so severe as those of the Great Plains nor much like those of the Middle Atlantic States. However, subzero temperatures and high winds are prevalent at certain times during the winter. Coupled with ordinarily dry falls, excessive winter-kill can occur, especially in weakened wood of trees and shrubs. However, a dry fall sometimes works to advantage, appearing to offer some protection against early, but not always against mid- to late-winter subzero snaps.

The behavior of the 'Golden Bell' forsythia *(F. intermedia)* commonly planted hereabout can be cited. Ordinarily, if the temperature dips to —10°F. or below, flower-bud blasting is likely to occur. After a dry fall, we experienced in December, 1963, a long spell of about two straight weeks when the temperatures dropped below zero at least once every twenty-four hours, and there were several days when the temperatures dropped well below —10°. The rest of the winter was relatively mild and only equitable temperatures near freezing were encountered. Forsythia bloomed

well during this past spring in most areas, except in low spots and in places (like my lot line) where fall lawn watering was heavy.

The winter weather in the Chicago area is, nevertheless, something to be firmly respected. The old and time-tested formula that hardy shrubs (such as lilac) may be planted in the fall, but that trees, especially those to be planted bare-root, must be planted in the spring, should be observed in any landscaping venture to minimize risk of loss. However, improved nursery techniques (fertilizing and mechanical) in growing, root-pruning, and transplanting are making fall transplanting less of a risk, if planting at that time becomes a necessity. Some notable success in fall transplanting has been enjoyed at the Morton Arboretum (about thirty miles west of the Chicago Loop) where low winter temperatures during the past several years have been recorded around −30°.

A strict rule to be followed after every planting of trees and shrubs is to water and to maintain a regular schedule of watering for *at least one* and *preferably two years.* If this is not possible on a regular basis, then some means must be employed to keep the soil temperature and evaporation at a minimum. A *porous, long-lasting mulch* can do this quite well: I have found that wood-chips obtained from the chopping machines of tree-trimming concerns and power companies serve splendidly in every respect, and decay is apparently slow enough not to create a bacterial-induced nitrogen deficiency.

For the newcomer to the Chicago area (particularly from southern New England and the Middle Atlantic States) a reasonable amount of caution is necessary in the choice of plants, particularly of trees and shrubs. However, the deplorable but understandable pessimism which has long settled upon our local nursery industry, engendered by the vagaries of the climate and a supposed alkalinity of the soil (our soil is generally subacid in the clay-loams and acid in the sandy soils) should not deter the home owner, landscaper, and plantsman from trying new (at least for this area) kinds of plants. The bulletins published by the Morton Arboretum have proved helpful in this respect. One should take heart in knowing that soils can be manually corrected and water artificially applied; that protection against wind and excessive sun can be constructed as fences or grown as trees and shrubs. In short, the requirements for accomplishment are motivational and monetary. And new horticultural breakthroughs are being made each year in this area.

No survey would be complete without mention of the agencies through which horticultural research in and for this region is being conducted. The average home owner and gardener has found solace for his landscaping woes and soothing horticultural vistas for his prairie-sated eyes in the several hundreds of acres of rolling countryside developed by the Morton Arboretum in Lisle, a privately financed institution west of the city. Throughout the years this arboretum has been virtually the sole leader in testing and disseminating woody plants adaptable for the Chicago area. Woody plants, such as a winter-hardy strain of the redbud, have been discovered and tested, and have become the bases for a more varied selection of plant materials to the burgeoning landscaping industry. A new botanical garden sponsored by the Chicago Horticultural Society, privately financed initially and to be maintained eventually by public funds, is soon to be constructed in Skokie (a north suburb) on land furnished by the Cook County Forest Preserve District (itself a model district of its kind). Unfortunately, the one strictly public-financed agency, the College of Agriculture of the University of Illinois, has provided little meaningful contribution to the horticulture of woody ornamentals in the Chicago area. Perhaps the remoteness of its location in Urbana (one hundred and fifty miles south) has prevented a recognition of the usefulness of these kinds of studies. And last but not least, there have been numberless imaginative and resourceful amateurs who have provided a quiet sort of leadership in the art of successfully growing plants.

To the perspective horticulturist there is one disturbing factor which, I might add, need only be temporary. This is the tendency, when initiating or expanding horticultural research facilities, to pay so much attention to the outward trappings of serious horticultural research, that only lip-service is paid to the actual research being or to be carried

An autumn vista from the Administration Building of the Morton Arboretum, Lisle, Illinois.

on. It should always be remembered by these agencies that *facilities and equipment must still be used by knowledgeable human beings.*

Finally and in retrospect, if this account appears to present our horticultural climate rather on the dry side, I need only look out of the window on this gray, June day to see the gentle rain falling, falling . . . and our precociously browned lawns shall become green again.

WINTER INJURY DEFINED

By R. G. Mower

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It is sometimes forgotten that many of the woody plants in our gardens came originally from other parts of the world. Frequently they are found growing naturally in environmental situations which are quite different from those in which they are grown as ornamental plants. Many of the showiest kinds are the result of extensive hybridization and selection and usually have a complex parentage and origin. As a result of this diverse background, it is not surprising that a number of the woody ornamentals available for landscape planting are highly variable in their response to the different environmental conditions which exist in this country.

The usefulness of plants for any particular locality is determined primarily by their *winter hardiness,* their ability to tolerate the cold of winter out-of-doors. There are always some plants in any area which seldom, if ever, suffer damage from low temperatures; they are *completely winter-hardy* and, because of this, should occupy the key places in the planting scheme. There are others which may be injured by winter cold but are still good for landscape use. Their desirable features, such as foliage, flowers, fruits, or fall colors are not seriously affected or, if they are, this problem occurs only occasionally. These plants are *usefully winter-hardy* and form a very important part of the woody ornamentals suitable for landscape planting in any hardiness zone. Effective use of these plants depends upon: 1) an understanding that they will be injured occasionally; 2) a recognition of the types of damage to expect; and 3) a knowledge of the best procedures to follow in order to avoid or reduce winter injury.

Winter injury of *Forsythia intermedia*—the killing of flower buds above the snow line, with little or no injury below.

In the Northeast, the prominent types of winter injury are those involving the complete plant, tops of plants, flower buds, evergreen leaves and, on larger plants, portions of the trunk.

Injury to the complete plant

The most severe and conspicuous type of winter injury is the death of the entire plant. Generally the survival of a plant in a particular area depends upon the inherent hardiness of the root system. There are many kinds of plants which cannot be grown in upstate New York, for example, because they cannot tolerate low temperatures; they either die or are so severely injured that they serve no useful purpose in landscape planting. It should be emphasized that some kinds of plants which are completely winter-hardy in one section of the country may be killed by low temperatures in another section. Whenever possible, it is always advisable to obtain the advice of a competent plantsman about the local performance of the particular species or variety of plant in which you are interested, especially if it is coming from an area where the climate is different. This is very important if the plants are to form an integral part of the landscape planting. It is not intended, however, to discourage the interested gardener from experimenting with some of the more tender kinds.

Killing of the tops

Low temperatures may kill a portion of the tops of many woody ornamentals. In severe cases, the tops may be completely killed to the ground-level and, if the plant is to survive, new shoots must be produced at the base. This type of damage can often be recognized in the spring by the accumulation of dead twig tips on stems which went into the winter in good condition. Stems partially covered by snow or artificially protected survive somewhat better, and frequently there is a definite line of demarcation between the injured stems above the protected area and the healthy stems below.

Injury to the tops of plants does not necessarily destroy their ornamental value. In Ithaca, Jackman clematis, *Clematis jackmanii,* is commonly killed two-thirds of the way

Winter injury of *Cornus florida rubra*—the failure of bracts to develop properly, as indicated by the two at lower left.

to the ground each year, yet it is still very useful for landscape planting. Since the flowers are formed on new growth, its landscape value is not lost. However, annual pruning is necessary to keep the plants neat in appearance. There are other plants which may be injured occasionally, yet are useful if allowance is made for this. California privet, *Ligustrum ovalifolium,* develops into a very large plant on Long Island and is widely used for screening purposes. In central New York, it cannot be relied upon to reach its full potential, since low temperatures periodically kill it back to the ground; in this area of the State, it makes a very effective small hedge.

The useful landscape features of some woody plants are destroyed if the tops of the plants are injured; and if this occurs frequently, then hardier forms should be selected.

Killing of flower buds

Many plants which form flower buds in the fall are of limited use in the colder regions of the Northeast, because the buds may be injured during the winter months. Many of these plants have large, conspicuous flower buds, and winter damage can be easily recognized in the spring, when the buds fail to develop properly or simply drop from the plant. Some kinds, however, have very small and inconspicuous flower buds, and winter damage is more difficult to recognize. The frequency of loss will largely determine the usefulness of the plant for general planting, particularly if the floral display is the only important landscape value. On Long Island the showy border forsythia, *Forsythia intermedia,* flowers well nearly every year; in Ithaca, it does well about three years out of every four; and in northern New York, it flowers about once in every ten years. As the showy flowers are the most important feature, forsythia cannot be considered usefully winter-hardy in the colder parts of the State.

Other ornamental plants which suffer prominently from flower-bud killing are flowering dogwood, *Cornus florida,* Kousa dogwood, *Cornus kousa,* American redbud, *Cercis canadensis,* the flowering quinces, *Chaenomeles* spp., and several species of *Rhododendron.* In the coldest parts of the Northeast, flower-bud killing is often associated with twig killing as well. In slightly warmer areas, the flower buds are destroyed, but the rest of the plant usually remains unharmed.

The spring flower display of some ornamentals is reduced or prevented not so much by cold winter temperatures as by late spring frosts. This injury is most noticeable in the partially or fully opened blossoms of early-flowering plants such as saucer magnolia, *Magnolia soulangiana,* star magnolia, *Magnolia stellata,* Korean rhododendron, *Rhododendron mucronulatum,* and the fragrant viburnum, *Viburnum fragrans.* It has often been observed that a shady location, such as the north side of a building, or a dense planting remains cooler in the spring, and growth is slightly delayed. A slight delay is often enough to save the flowers from extensive damage.

Burning of evergreen leaves

Almost all plants which hold their leaves over winter are subject to at least occasional "burning." After such injury the leaves appear as though scorched by fire and have a characteristic brown color and a hard, dry texture. Apparently this is an indirect, rather than a direct, injury from low temperatures. Evergreen leaves lose water throughout the year. During times when the ground is frozen, the leaf temperature is often relatively high because of absorption of heat from the sun and considerable water is lost to the air. Because no water is able to be conducted from the roots to the leaves, the leaf tissues dry out. Wind increases the

Winter injury of *Spiraea thunbergii*—the killing of twigs.

water loss from foliage with the same result.

Winterburn is serious in some sections of the Northeast on at least some species of evergreen conifers and on nearly every evergreen species of barberry *(Berberis)*, holly-grape *(Mahonia)*, euonymus, holly *(Ilex)*, boxwood *(Buxus)*, cotoneaster, andromeda *(Pieris)*, firethorn *(Pyracantha)*, and viburnum.

Injury to the trunk

Splitting of the trunk may occur on a large number of ornamental trees—the wood may split to the center or nearly through. Callousing is generally rapid, but in subsequent years the crack is sometimes reopened on cold days, closing again with a rise in temperature. Frost cracks will generally heal over well where there is no reopening. Cracks which do reopen can be closed and kept closed with bolts across the crack, and normal callousing will follow.

Sunscald or injury to the surface areas of the trunk may occur on the sides of the trunk exposed to the winter sun —the result of the extreme temperature fluctuations which occur in the bark from day to night. Characteristically this type of injury is found on the southwest side of the trunk. Sunscald is of no great importance on ornamental trees except those which have a smooth bark, such as beech *(Fagus)* and red maple *(Acer rubrum)*, and particularly young trees which have not developed their characteristic corky bark. Sunscald is more likely to occur when thin-bark plants are moved from shade into a sunny position.

Methods of reducing winter injury

The best way of avoiding winter injury to ornamental plants is to select only the hardiest kinds, but even these must receive a reasonable amount of care if they are to thrive.

Certain species of woody ornamentals, such as the Pacific flowering dogwood, *Cornus nuttallii*, are native in sections of the country where temperatures fall as low as in many parts of the Northeast, yet these species cannot be grown here. This is not due to a lack of inherent winter hardiness. The plants fail to survive the winters here because other climatic factors make them unthrifty; cold weather is merely a contributing, not a limiting factor. Perhaps when the key factors become better understood, plants of this type can be successfully grown.

While so far it has been impossible to provide some plants with the growing conditions they require, their range of hardiness has been increased. The Douglas fir, *Pseudotsuga menziesii*, from the warmer coastal areas along the Pacific Ocean, is not sufficiently winter-hardy for general use in the Northeast, but a hardy strain selected from higher elevations in the mountains has proved to be very satisfactory. It seems probable that more work will be done along these lines and that the range of available material in the colder regions will be increased.

Other things being equal, vigorous specimens suffer the least winter injury. In order to produce healthy growth, the gardener must first consider soil conditions. Soils should have sufficient nutrients and, above all, a constant moisture supply and good aeration.

Most plants grow best in a well-aerated, loamy soil, which has enough, but not too much, moisture. Such "ideal" soils seldom exist in most planting areas and soil modification may be helpful in overcoming some of the difficulties. Clay soils are often heavy and wet. The excess moisture can be drained by mechanical devices such as tiles, or layers of gravel and stones under the plants. Humus, or organic matter, added to the soil will help to improve aeration. Clay soils treated in this manner will neither be waterlogged in wet seasons nor dry and hard-baked in dry seasons. Sandy soils are too well drained and plants growing in them often suffer from drought. Organic matter added to these light soils will help retain an adequate moisture supply during dry weather, and a summer mulch of straw, leafmold, peat moss, pine needles, or wood chips will reduce evaporation and thus conserve moisture. If during periods of drought, additional watering is necessary, a few thorough soakings are better than many light sprinklings.

While some plants are adaptable to a wide range of moisture and light conditions, others have more definite requirements. Every effort should be made to meet these needs, especially for types subject to winter injury. If mountain-laurel, *Kalmia latifolia*, rhododendron, and other ericaceous plants are to be grown, peat moss, leafmold, or other material with an acid reaction should be used to supply the organic matter. These plants should also be grown in partial shade in moist, well-drained soil.

Trees and other large plants often take more than their share of moisture and sunlight; as a result, smaller specimens planted nearby may not do well. This should be kept in mind when selecting locations for somewhat tender kinds.

Many properties are in frost pockets, or depressions into which cold air settles on quiet nights, and here temperatures may go considerably lower than on slopes where there is good air circulation. Less hardy plants may fail in such a situation.

During the winter months it is possible to reduce or avoid foliage-burn of conifers and broad-leaved evergreens by following these precautions:

1. Use a permanent mulch to keep the moisture supply constant during the growing season and to prevent excessive freezing of the soil in winter.
2. Make sure that the plants have an adequate supply of water before the ground freezes. If needed, water the plants thoroughly in late fall.
3. Locate specimens which are subject to burning in positions where the wind and snow will affect them least. A location sheltered from the prevailing wind and the winter sun is ideal.
4. Increase protection by using artificial shades and windbreaks. Wooden frames covered with burlap or evergreen branches are often sufficient. When a plant is not in a good location, artificial shade is imperative.

These same precautions, if followed with deciduous plants such as the magnolias, and the Japanese maple *(Acer palmatum)*, will extend their usefulness into colder sections in which they could not be grown otherwise.

Some woody plants are slow in becoming established and need protection during the first few winters after being planted in a new location. Plenty of moisture during the growing season, a good mulch in winter, and protection from the winter wind and sun are usually sufficient. Sun-

(Continued on page 235)

OTHER USES OF DAY-LILIES

By SHIU-YING HU

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The flower, the fruit, and the tuberous roots of *Hemerocallis flava.*

INTRODUCTION

THE DAY-LILIES (various forms of *Hemerocallis flava, H. fulva,* and related species) are among the most valuable herbaceous perennials introduced from China to American gardens.

On account of their attractive foliage, their conspicuous and colorful flowers, their exquisite and graceful forms, their superior ability to compete with weeds and to withstand droughts, and their complete cheerfulness in the face of neglect, the day-lilies have been planted in gardens large and small and along highways and byways throughout the United States.

In the use of day-lilies, American gardeners have adopted and amplified only one of the merits of the species discovered by the ancient Chinese, the ornamental merit. The economic and medicinal merits of the species known to the people of eastern Asia, from Korea to Vietnam, is practically unknown to the American public. This condition, however, has been slightly changed, for in the past decade a dynamic social and cultural change in America has brought about use of the day-lilies other than as ornamentals.

Voluminous publications are available on their horticultural merits, cultivation, identification, hybridization, and the proposal and description of new hybrids. The scope of this article is limited to the uses of day-lilies other than for ornamental purposes. It is devoted to the use of day-lily flowers for food and the crown and root for medicine.

In large cities and small towns classes in Chinese cooking are offered by university extension services, city adult educational centers, or private cultural organizations. Meanwhile, new Chinese restaurants emerge, like colorful fresh mushrooms over the meadow after a summer night rain, in American cities, suburbs, and wayside rest areas. The American people have not only patronized these restaurants for ready-cooked food, but have expressed their genuine interest in learning to prepare the oriental dishes themselves. Chinese recipes appear in newspapers and a number of books on Chinese cooking have been published. But what about the source material? Instructors, homemakers, and herb-growers alike have turned to botanists who know the plants and their uses. Letters of inquiry come to me repeatedly, many of them concerning the use of flowers in Chinese dishes. In particular, the Editor of the *Herb Grower Magazine,* Mrs. Philip Foster, has inquired about the use of day-lily flowers in Chinese cooking and requested recipes. Moreover, the discoveries of effective principles in old remedies, from such plants as *Ephedra, Rauwolfia, Dioscorea* and so on, for the cure of serious ailments of the vital respiratory, circulatory, and other organs have impelled modern botanists to search deeper into the medicinal values of the flowering plants. As a matter of fact, here at Harvard University, both the Arnold Arboretum and the Botanical Museum have received special grants for research on medicinal plants. It is opportune for me to introduce the Chinese practices on the use of day-lilies as vegetable

and as medicine to the readers of *The Garden Journal.*

The Names and their Meaning

The day-lilies are known to the Chinese people by several names which are distinctive both in pronunciation and in meaning. Among the Chinese farmers who cultivate the plants and gather the flowers, the day-lilies are called *Huang-hua-ts'ai* (Yellow Flower Vegetable) or *Chin-chen-ts'ai* (Golden Needle Vegetable). Both of these names imply the edible nature of the species. The first name points to the color and the second to the shape of the edible portion of the plant. Among poets, artists, and other literary people, the day-lilies are known as *Hsuan-ts'ao* (Mother Herb) or *Wang-yiu-ts'ao* (Forget Trouble Herb). These names allude to a philosophy upheld by the Chinese intelligentsia of the Confucian school that mother's love is such a precious blessing it consoles the distressed mind and cheers the low in spirit. Being a symbol of mother love, day-lilies are frequently used by poets in their verses and by artists in their paintings.

The close and varied associations of day-lilies with the Chinese people since time immemorial have created folklore and legends. Accordingly it is said that if a pregnant woman wears the flowers of the day-lily at the girdle, the child will be a boy. In this legendary connection the day-lily is also called *I-nan* (Better Be Boy). It is also said that deers love the leaves of day-lilies, and so in some books the name *Lu-ts'ung* (Deer Onion) is recorded for day-lilies.

Cultivation and preparation for market

Although the day-lily flowers are used extensively as an article of food and the crown and root as medicine in China, one does not find day-lilies as abundant there as in the United States. The wild species are found in isolated clumps among grasses and herbs on the slopes of mountainous areas in western and northern China where the land is sparsely populated. Day-lilies are not planted in large patches such as one may see along the highways in eastern United States. Perhaps the constant picking of the flower buds and pruning of the roots have checked the aggressiveness of the plants. Actually, in China, day-lilies are rarely grown around ordinary houses. They are planted as a minor crop for ready cash and are placed along the edges of fields or vegetable gardens where the land is too steep or too dry for the major crops. It is only in temple grounds, in the backyards of poets and artists, or in the castles of government officials, that day-lilies are planted as ornamentals. Propagation is done by division.

Although the mature flower buds are delectable, the thrifty Chinese farmer's wife seldom prepares a day-lily dish for her own table. They are a cash crop and must be sold to augment the family income. Because of their highly perishable nature, the day-lily flowers are carefully dried on the farm. Fresh flowers are not seen in the market. The dried product appears brownish yellow, wrinkled and twisted, and is frequently covered with a whitish mold or bloom. It is amusing to note here that many city folks who use the dried flower buds have no idea that the common day-lily is the source of the *Chin-chen-ts'ai* which they esteem so highly at the table. Among my non-botanical Chinese friends in America, I have not found one who does not respond with delightful surprise when told that the day-lily flower buds are the source of *Chin-chen-ts'ai.* Perhaps this is the reason for the large importation of dried day-lily flowers from Hongkong to meet the demands of Chinese-Americans, particularly the restauranteurs.

In preparing day-lilies for the market, the farmers pick the mature flower buds early in the morning, just at the time when the flowers begin to open. These buds are brought home and steamed immediately, then they are spread one by one on a mat and dried in the sun. Experienced field botanists all know the principle of killing the plant cells of fleshy specimens, flowers or fruits, by the application of sudden heat or chemicals. Such treatment helps to shorten the drying process and to keep a better color in the specimens. Apparently experience has taught the Chinese farmers this principle, and they have put it into practice in the preparation of drying day-lily flowers for marketing.

In the genealogy of the Lily Family, the day-lily line stands as a lone survivor of that branch of the family tree. In other words, the genus *Hemerocallis* has no close generic relative. Under the selective pressures of nature, the ancestors of the present-day species of *Hemerocallis* gradually acquired the superior qualities for survival by having: 1) their tender growing points hidden in mother earth under the straw-mattresses of their own dead leaves, so that life is protected from freezing during winter; 2) their roots become the thickened, fleshy, and mucilaginous storage organs, so that at the resumption of growth in the spring life is provided with both food and water; 3) the ability to produce slender underground stems, *the rhizomes,* so that when competition for light, water, and mineral salts becomes too great, life can be carried a foot or so from the mother plant and started anew in a more favorable spot; and, finally, 4) the power of vegetative reproduction by root division so that, in the face of failure of seed production, because of the lack of pollinating agents or other environmental, physiological, or genetic factors, life may continue. The ancient Chinese have observed the concentration of material and the continuation of life in the underground portion of the day-lilies; and in their battle with hunger and diseases, they have not only learned the use of day-lily flowers for food, but have also discovered the value of the crown and root for the conservation of health. In this respect, the crown and roots are trimmed off the plant in the autumn or early spring before the leaves appear. These are dried in the sun and used as medicine.

Marketing

The marketing of dried day-lily flower buds within China and in the world trade is noteworthy. In rural China there are collectors, carrying two willow- or bamboo-baskets at the ends of long poles on their shoulders, who travel from village to village to collect small farm products. In the case of day-lilies these collectors transport their collections to the nearest town, where wholesale merchants receive and distribute them locally or pack and ship them to larger cities. For shipment, the dried day-lilies are packed in large, rough, bamboo baskets, these bales usually weighing three or four hundred pounds. For world trade, the dried buds are repacked in Hongkong. There the export merchants put

the material into smaller packages, attractively packed and labeled to appeal to the overseas Chinese. It has been estimated by the United States Appraiser's Office that in New York City alone some four thousand pounds of dried day-lilies are imported annually. In the Chinese groceries in America, the dried day-lilies are called *gum-jum* or *gum-tsoy,* a special Cantonese pronunciation for Golden Needle or Golden Vegetable.

The marketing of that part of the day-lily used for medicinal purposes is limited to the inhabitants of cities, for in rural China the people live on the good earth. The underground part of the day-lily, like any other medicinal plant, is collected as the situation calls for and used fresh. In Chinese cities, however, medicinal plants are dispensed by two groups of people, the pharmacists and the herb-dealers.

The pharmacists are owners of expensive official dispensaries. The walls of their stores are lined with cases full of pigeonholes, shelves, and boxes. The material they sell is partially cured or prepared. These may be clean, dry bulbs, sliced stems and roots, dry flowers, small fruits or seeds, sliced large objects, steamed and dried fleshy roots and fruits, and even pills, extractions, and tinctures. The pharmacists dispense according to the prescriptions made up by the old-type Chinese physicians. They do not diagnose or prescribe.

The herb-dealers, on the other hand, diagnose, prescribe, and sell medicine. They may be herbalists who own very primitive, small shops with plants hanging from ceiling and walls to the floor, crowded on shelves, even drying on the sidewalk in front of the shop. A large number of herb-dealers are itinerant vendors who peddle a few hundred objects carried on their shoulders with a long pole and two simple frames. The objects sold by the herb-dealers are uncured medicine *(Ts'ao-yeuh).* It is from the herb-dealers that fresh or partially dried roots and crowns of the day-lily are always available.

Food and Medicinal Value

The dried day-lily has long been a delight to the Chinese gourmet. Modern science has proved this gustatory and nutritional choice completely sound. Chemical analysis of the dried flower bud shows that 11.42% of the dry weight is protein, 3.3% minerals, 2.27% fats, and 8.48% crude fibers; the content of Vitamins A and B is also high, so that one finds in day-lilies a high-protein, non-fattening food which is rich in both minerals and vitamins. It is very likely that fresh material contains a higher vitamin value, but the dried form has better flavor.

The use of the underground part of the day-lily for medicine is not limited to the people of China. The practice has been adopted by all Asians who have assimilated the Chinese culture, from Korea to Vietnam. In my article, "Medicinal Plants of Chengtu Herbshops," published in 1945, I noted: "The spindle-shaped, thickened, fibrous root of the plant, about 8 cm. long and 1.5 cm. thick, is boiled with pork. The preparation is administered to promote the formation of blood cells, to give strength, to relieve a feverish condition and to cure toothache." Numerous ancient Chinese herbals, for example, Li Shih-chen's *Pen-ts'ao-kang-mu (Chinese Material Medica)* published in 1590, have recorded that the underground part of the day-lily is used to reduce temperature (antifebrile), ease pain (anodyne), and as a diuretic. It is prescribed for dysuria, lithiasis, dropsy, gonorrhea, jaundice, piles, and tumor of the breast. Scientific investigation into the active principles of the plant for such empirical practices is still lacking. Just as a reflection to a possible pharmaceutical discovery in the day-lily crown and root, I should like to mention that for the cure of acute gout, a small amount of colchicine, an extract of a liliaceous plant, *Colchicum autumnale,* is currently prescribed to help the excretion of excessive uric acid from the body and to reduce pain. Could it be that the Chinese have found another liliaceous plant which contains an effective principle for the cure of acute gout as does colchicine, yet not poisonous as is the latter? The answer to this question awaits pharmaceutical research. Here it should

The author, Dr. Shiu-ying Hu, among day-lilies growing in partial shade in the oak woods on Bussy Hill in the Arnold Arboretum, Jamaica Plain, Massachusetts.

be pointed out that the day-lily has an obvious superior quality over *Colchicum,* that is, the availability for large-scale production because of its large size and numerous fleshy roots.

Recipes

Day-lily flowers may be used either fresh or dry. In preparing day-lilies for cooking, the stamens, pistil, and the receptacle of a flower are removed. With dried material, the flowers are first soaked overnight and then the above-mentioned parts are excised. The flowers may be used whole or in one-inch-long pieces, as the recipe requires. In the following recipes the measurements given are for either fresh material or the soaked, dried form after being cleaned.

Day-lily dishes are in the finest tradition of Chinese cooking. To make the dishes truly Chinese in appearance and flavor, a few special ingredients have to be purchased from an authentic Chinese store, either directly or by mail. The following items are inexpensive and generally useful in Chinese cookery. (1) Bean thread *(Fêng-sze),* a product of *Phaseolus mungo.* It appears like thin, white vermicelli in the market. When put in boiling water, it becomes soft and transparent immediately. (2) Sesame oil *(Tsu-ma-yiu)* of which there are two kinds in American markets. The imported kind, produced from roasted seed, has a rich brown color and an excellent aroma. This is the one recommended. (3) Fresh ginger *(Shêng-chiang),* which is the irregular, thick rhizome of the ginger plant. In addition to these three articles, soy sauce, which is available in most groceries, should always be within reach when one prepares Chinese food. Recipes A—D are for day-lily dishes with meat and recipes E—F are for meatless dishes for vegetarians.

A. Day-lily Sliced Chicken

1 chicken breast
1 medium-sized onion
1 tsp. chopped fresh ginger
1 tsp. salt
3 cups day-lily
1 tbsp. soy sauce
1 tbsp. corn starch
3 tbsp. vegetable oil or bacon fat

Slice the chicken breast into paper-thin pieces. Chop one-fourth of the onion. Place both in a mixing bowl. Add salt, ginger, corn starch, and soy sauce. Mix thoroughly. In a frying pan over a strong fire heat two-thirds of the oil, quick-cook the meat mixture for two minutes, stirring to prevent burning. Pour out the meat and clean the pan. Use the rest of the oil to brown the rest of the onion (in large slices). Add day-lily, salt, ¼ cup of water, and the cooked chicken. Cook for two more minutes and serve immediately; for two or three persons.

B. Day-lily Sliced Pork

3 shoulder pork chops
1 tsp. salt
¼ tsp. sugar
3 or 4 tbsp. shortening
3 cups day-lily
1 tbsp. sherry
1 tbsp. soy sauce
1 tsp. chopped ginger
1 tbsp. corn starch
1 clove garlic
2 onions

Slice the meat into paper-thin pieces, cutting so that each piece has some fat. Mash the garlic. Chop half an onion into small pieces and cut the rest into large slices. Thoroughly mix the meat, mashed garlic, chopped onion, salt, soy sauce, ginger, sugar, and cornstarch. Brown the sliced onion in a large frying pan. Pour in the meat mixture, add sherry, and cook for three minutes, stirring to prevent burning. Add day-lily, sliced onion, water, and stir. Cook three to four more minutes and serve immediately; for four persons.

C. Day-lily Soup

1 lb. pork chop bones or ribs
¼ tsp. whole black pepper
1-½ quarts of cold water
½ cup diced potato
1 onion
2 cups day-lily
1 tbsp. salt
1 tbsp. sherry
2-3 slices giner

Wash chop bones or ribs and cut into one-inch pieces. Slice the onion and brown over medium heat for one minute. Add bones, salt, and fry for two minutes. Pour in the sherry and cook one minute, stirring. Add water and transfer the mixture into a soup kettle. Add potato and pepper. Bring to a boil and simmer for one hour. Five minutes before serving, add day-lily and continue to cook over medium heat for two to four minutes. Serves four.

D. Quick Chicken Day-lily Soup

1 can condensed chicken bouillon
4 cups cold water
3 ounces dry bean thread
3 cups day-lily

Bring bouillon and water to a boil. Ten minutes before serving, add the bean thread. Three minutes before serving add the day-lily. Add salt and pepper to suit taste. Serves four.

E. Buddha Disciples' Delight *(Loh-han-chai)*

According to a Chinese folklore, Buddha had eighteen close disciples who were exclusively vegetarians. An authentic dish of Buddha Disciples' Delight should contain eighteen ingredients of plant origin. The material which this dish calls for is available in Chinese stores in America. This is a specially good dish for parties, because it can be prepared a day ahead and warmed up over low heat just before serving. The following recipe serves ten to fifteen people.

10 cups day-lily
2 oz. *fa-ts'ai*
6 oz. bean thread
4 oz. dry mushrooms
4 oz. *hal-tai*
1 oz. *mu-erh*
6 oz. *fu-chu*
1 can bambo shoots
1 can wheat gluten
1 can water chestnut
2 cups fresh ginkgo seed
2 oz. fresh ginger
1 lb. lotus rhizome
6 medium-sized onions
1 lb. fried bean curd square
6 cloves garlic
¼ tsp. black pepper
½ cup soy sauce
¾ cup vegetable oil
1 tbsp. sesame oil
2 tbsp. salt

The first seven items are dry goods; they must be soaked in separate containers for two to six hours before being cooked. The soaking process can be shortened by using boiling water at the beginning. *Fa-ts'ai* (Hair Vegetable)

(Continued on page 228)

FLOWER RADIOGRAPHY

Photographs by Harold F. Sherwood of the Physics Department of Kodak Research Laboratories, Rochester, New York.

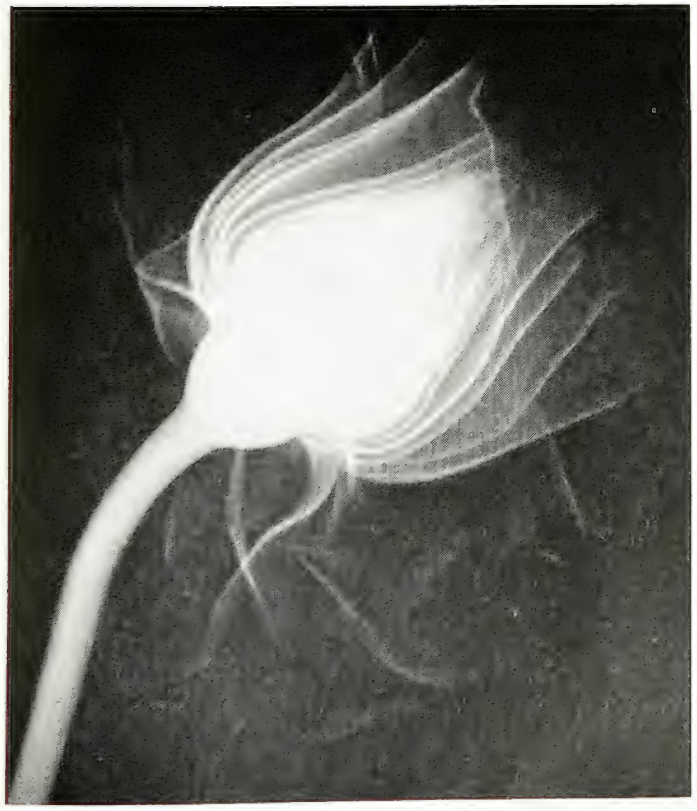
EXTERNAL EXAMINATION is one means of examining a flower or plant. Microscopic inspection is another. However, botany takes on a new dimension with the use of x-rays, or the method of radiography.

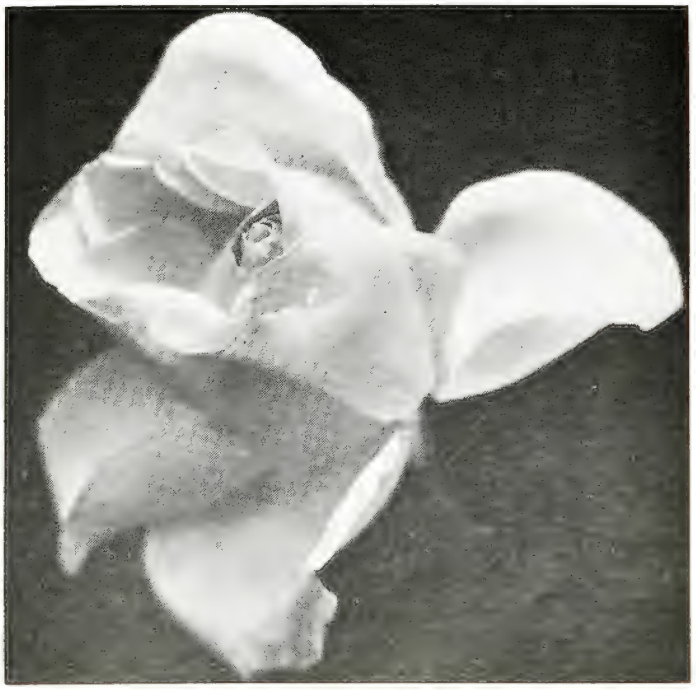
While radiography has provided a rare insight into the unique internal structures of flowers, it also provides unique beauty. The delicate parts of a flower appear even more delicate and flowing in the radiograph. One can see clearly Nature's expert engineering skill in creating the stems' cellular columns to support the weight of the flowers and leaves. One can view the complex and delicate framework upon which the leaf-substance is spread.

The artist may discern in these radiographs many possibilities with respect to decoration and design. The radiograph is the source of much unusual material, and also may be useful to the botany or science instructor in telling students of the inner workings of the plant and its blossoms.

Flower radiography is valuable in studying the influences of external factors on the plant. The influences of artificial sprays, of blight, and of animal life may be investigated. A botanist or plant physiologist also may find it possible to study the diffusion of liquid in a plant by injecting the plant with a solution containing a heavy element to provide strong x-ray absorption. Harold F. Sherwood and Dr. H. E. Seemann of the Kodak Research Laboratories stood samples of several kinds of dried wood in a lead-salt solution and demonstrated radiographically the differences in the rate of diffusion in the coarse and the fine-grained specimens. Work by Eastman Kodak Company research scientists in the field of botanical radiography has been conducted for many years.

Upper left. Radiograph of a gladiolus. Lower left. Radiograph of rose 'Sensation'. Lower right. Photograph of rose 'Sensation'. The radiographs of the gladiolus and rose were taken at 40-kv.





Radiograph of the bird-of-paradise, *Strelitzia reginae*.

To obtain acceptable radiographs of flowers, low-voltage, long-wavelength x-rays are required (a tube with a beryllium window is suggested); diagnostic x-ray apparatus usually cannot be adjusted to the 3- to 50-kilovolt range required for flower radiography. Care must be exercised that the specimen does not move because, as in a snapshot, this will cause blurring. Care also must be taken that the plant does not wilt appreciably during the exposure. This would provide a subtle and probably unobserved motion that would be detrimental to the quality of the radiograph. Except for the problem of motion of the specimen and the heat load of the x-ray tube, there is no objection to long exposures.

The botanist, plant physiologist, the science instructor, the artist, the designer, the radiologist—all find flower radiography one of the few scientific processes which can combine true investigation with true beauty.

USES OF DAY-LILY (Continued from page 226)

is a dry mass of a *Nostoc* collected and dried in Kansu Province of China. Dry mushroom *(Lentinus edodes)* is a black mushroom cultivated on decaying oak logs in Fukien and Anhwei Provinces. It has a very delicate aroma and texture. *Hai-tai* is the dried form of *Laminaria japonica*. *Mu-erh* is another cultivated mushroom *(Auricularia auricula-judae)* produced on the Tsing-ling Mountains. All these dry stuffs may have some sand or dirty particles; after being soaked, they should be cleaned. Hai-tai, mushroom, fu-chu, bamboo shoot, wheat gluten, water chestnut, fresh ginger, lotus rhizome, onion, and bean curd square need to be cut or sliced; ginkgo seeds need to be shelled. (The ginkgo seed can be picked up under any female ginkgo tree in October and early November. After cleaning and drying in the sun, it can be put in cold storage for use throughout the year.)

Slightly brown the sliced onion in vegetable oil, then transfer to a five-quart kettle and add all the ingredients except the sesame oil. Mix well. Add two cups of boiling water and bring to a boil over medium heat. Turn the heat low and simmer for one hour. Add the sesame oil just before serving.

F. Day-lily Salad

2 cups day-lily	¼ tsp. salt
½ oz. *liang-ts'ai*	1 cucumber
1 tbsp. sesame oil	⅕ tsp. ginger powder
⅕ can wheat gluten	1 clove garlic
1 tbsp. soy sauce	

Soak the *liang-ts'ai* (Cold Vegetable, refined sea weed = agar agar) in cold water one hour before serving. Peel the cucumber and grate it with a medium-sized grater. Just before serving, cut the wheat gluten into thin slices, mash the garlic, and mix all the ingredients together. Serves four.

OLD WORLD GARDEN IN THE NEW WORLD
TRYON PALACE GARDENS

By LARRY L. TRAMMEL

Mr. Trammel is Restoration Horticulturist of Tryon Palace.

LIKE A JEWEL IN A magnificent setting, Tryon Palace, restored Colonial and first State Capitol of North Carolina at New Bern, is surrounded by charming gardens designed in the manner of eighteenth-century gardens in England. Visitors from far and wide admire their authenticity and beauty.

Completed in 1770 by Royal Governor William Tryon, the original Palace was erected by a British architect as a British residence and government house for British officials in a British Colony. The main building was destroyed by fire in 1798. Restoration was accomplished between 1952 and 1959 by the Tryon Palace Commission, an agency of the State of North Carolina, with gifts and bequests of the late Mrs. James Edwin Latham, of Greensboro, North Carolina, a native New Bernian.

The restored Palace is an authentic reproduction of the original edifice with its two large wings. However, since there was no record of what type of gardens might have been here two centuries ago, it was deemed appropriate to have the Restoration gardens like those which flourished from 1760 to 1770 on comparable estates in England.

With few exceptions, the trees, shrubs, plants, and flowers used were known to Colonial gardeners before 1771. Some are European varieties, as the Colonists frequently imported seeds and roots. Others are native American plants, such as magnolia, yaupon, plane-tree, myrtle, laurel-cherry, and wild sweet crab, which they found growing in the New World.

The gardens were designed by Morley J. Williams, landscape architect. Since February 1, 1960, they have been in charge of Larry L. Trammel, a graduate of McNeese State College in Louisiana. Assisting with details are members of the Garden Committee of the Tryon Palace Commission, who have devoted much time to plans and projects.

The front exterior of Tryon Palace, New Bern, North Carolina, and one of the two wings.

On April 8, 1961, the tenth anniversary of Mrs. Latham's death, the Maude Moore Latham Memorial Garden was officially dedicated. This is an ornamental garden, with colorful flower beds bordered with dwarf yaupon, a central pool and fountain, bath-stone fruit baskets, antique terra-cotta urns, and four antique Italian marble statues. In the memorial pavilion there is a plaque honoring Mrs. Latham for "the rebirth of Tyron Palace and Gardens . . . to their former grandeur and beauty so that North Carolinians might know of their heritage."

The Kellenberger Garden, dedicated April 2, 1964, honors Mrs. Latham's son-in-law and only daughter, Mr. and Mrs. John A. Kellenberger, of Greensboro, Treasurer and Chairman, respectively, of the Tryon Palace Commission, who have worked untiringly through the years for the Restoration. This is also an ornamental flower garden attractively designed for colorful blooms, with Carolina jessamine, crewel vine, and pyracantha on tall redwood racks along high brick walls, and two statues—one, of limestone, of a boy holding a bird bath and the other a tall, carved, pink marble bird bath. (The crewel vine is *Araujia sericofera.*)

A green garden has trim evergreens accented with statuary and flanked by taller shrubs and crape-myrtle trees. This is intended to be enjoyed primarily from the Palace windows as was customary long ago.

Near the stable or west wing, restored dovecote, and ancient well is a work garden. This space has hotbeds with mist sprays and transplanting beds as a source of plants for use elsewhere. Its main feature is a shade house, the slats of which can be easily adjusted for more or less sunshine as required.

Last year the shade house was especially unique, when more than a hundred gourds were hanging there. These were of three eighteenth-century types: long dipper, dish-rag, and Hercules club or "Alley Oop" gourds. Some of them won prizes at both the State and County Fairs. For the 1964 season different kinds were planted, English flask and Oriental bottle gourds, and these, too, drew much favorable comment.

The Hawks Allée is named for John Hawks, supervising architect of the original Palace. The four antique marble statues and one terra-cotta statue were gifts of the Eleutherian-Hagley Foundation, of Wilmington, Delaware, through Mr. and Mrs. Henry Francis du Pont, of Winterthur, Delaware. They came from the famous garden of the late Mrs. Louise du Pont Crowninshield, sister of Mr. du Pont, on the site of the old du Pont powder mills. Mrs. du Pont, a member of the Tryon Palace Commission, is a direct descendant of John Hawks.

The Maude Moore Latham Memorial Garden is one of the several charming gardens at Tryon Palace, designed in the manner of eighteenth-century English gardens. In the memorial pavilion is the plaque honoring Mrs. Latham as the restoration donor.

Nearby, yaupon trained over an arched trellis forms a pleached allée, the interior sides being planted with large ferns, iris, periwinkle, hosta, ajuga, and lilies-of-the-valley.

The kitchen garden is famed for its one hundred and sixty-five espaliered fruit trees, one of the largest collections along the eastern seaboard. This garden contains scores of different vegetables, herbs, and fruits, as well as old-fashioned flowers, for in the eighteenth-century plants of intrinsic beauty commonly appeared in kitchen gardens, while many herbs and simples were used in ornamental gardens.

The vegetable beds are laid out in pleasing patterns, each bed being bordered with a different kind of herb, centered with two bricked dipping wells, such as might have been there two hundred years ago. Bordering the garden's walks are small, sweet French strawberries.

For show, not for sale, is a large bed of bright-leaf tobacco similar to that grown for generations in eastern North Carolina. Some of its leaves are dried and hung in the smoke house, along with other dried plants and herbs.

Of outstanding interest is Indian corn of a variety raised for one thousand years by Tuscarora Indians. Seeds were brought to New Bern in 1963 from upper New York

(Continued on page 235)

The Kellenberger Garden at Tryon Palace, also designed as an eighteenth-century English garden, honors Mr. and Mrs. John A. Kellenberger, under whose direction the Colonial Capitol was restored and the gardens planted.

PALEOBOTANICAL EXPLOITS IN COLORADO AND KANSAS

By HERMAN F. BECKER

Dr. Becker is Research Associate at The New York Botanical Garden.

THE DISCOVERY OF *Sanmiguelia,* a Triassic palmlike compression, revived a long-standing controversy regarding the age of the angiosperms. According to fossil evidence, flowering plants appeared in the middle to late Cretaceous, being well established by the end of that period and diversifying rapidly during the early Tertiary.

In 1953, Dr. G. E. Lewis of the United States Geological Survey in Denver, Colorado, had found palmlike leaves in the Triassic Dolores Formation of the San Miguel Canyon near Placerville, Colorado. He showed his fossils to the late Dr. Roland W. Brown, paleobotanist of the United States Geological Survey, and both sensed an exciting discovery. There was nothing unusual about fossil palm leaves, many had been found before, but none were of Triassic age. If these specimens were really palms, then the age of the flowering plants would have to be extended by ten to fifteen million years. Brown named the plant *Sanmiguelia lewisi,* honoring its discoverer and the locality, and published reports in the March, 1956, issue of the *National Geographic Magazine* as well as a scientific treatise in the U.S.G.S. Professional Paper 254-H, 1956.

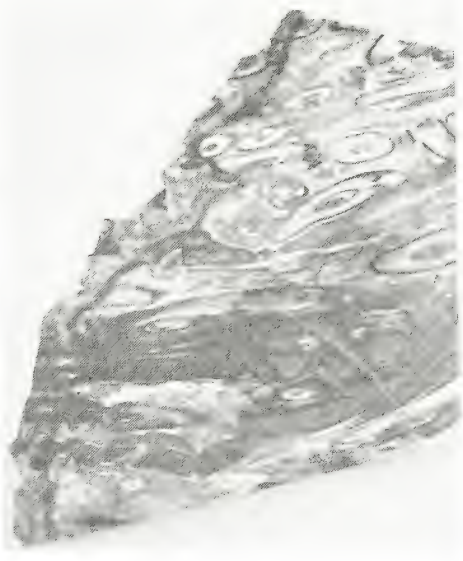
According to external characters the imprints look like juvenile leaves of a thatch palm or palmetto, plicated, entire, oval, but tapering apically and with a broad petiolar base. They are up to twenty-four inches long, and there are no leaves of any living plants, save palms, to which they bear resemblance. Brown, therefore, suggested affinity to the *Palmaceae* pending more conclusive information, and logically termed them the earliest angiosperms.

Such a drastic and unconventional interpretation of this unusual discovery aroused widespread incredulity among professionals who, contrary to existing evidence, suggested affinity to some undefined pre-Triassic gymnosperms, cycads or even ginkgos—in short, anything but angiosperms. The fact that undisputed angiosperms exist in the Cretaceous, presupposes their development and evolution, of course, during pre-Cretaceous time, the Jurassic, Triassic, or even late Permian. Unfortunately, any conclusive fossil evidence of angiosperm evolution is lacking for these periods.

Dr. Chester A. Arnold of the University of Michigan became interested in this intriguing problem and invited me to accompany him in search of not only more and better sanmiguelias but, if possible, of fruits, seeds, and wood. In this endeavor we were only partially successful. We discovered dozens of leaves but none with complete petioles, nor did we find fructifications or wood. And so the question of undoubted relationship still remains to be answered. *Sanmiguelia* "looks" like a palm and like nothing else, fossil or living, but "may" well be an extinct relative of some other known or unknown group. Had the fossils been found in younger formations, no one would have hesitated calling them palms.

Paleobotanically, therefore, no specific contribution resulted excepting the discovery of larger specimens (twenty-four inches) than those reported by Brown (eighteen inches), the discovery of an extremely productive site with-

Lower left. A large fossil leaf of the *Sanmiguelia* "palm" removed from the sandstone matrix. Center. Fragment (11" x 6") of a twenty-two-inch leaf (estimated) of *Sanmiguelia lewisi* now on view in the paleobotanical exhibits at The New York Botanical Garden. Lower right. A coal ball "peel" of *Lepidostrobus pulvinatus,* the cone of a *Lepidodendron,* from the coal-ball area of southern Kansas.



Collecting fossil leaves of *Sanmiguelia lewisi* in situ in the Triassic red sandstone of the Dolores Formation in the San Miguel Canyon near Placerville, Colorado.

in the formation, and possibly added interest regarding the earliest angiosperms. One factor, however, stands out, posing a significant question. All leaves found by Lewis and Brown, by our party this spring, and by other collectors, are of the elongate, oval type. They are entire with a pleated lamina and have parallel (monocotyledonous) veins resembling seedling or early-stage leaves as in germinating coconuts and palmettos. Not one fossil compression displays the often typical "palmate" leaf with separate tips for each major vein. It is unrealistic to assume that *only* juvenile leaves were preserved. In any collection of fossil leaves, palms or other species, a size-variational gradient is observed, rarely including juvenile forms. We assume rightfully, therefore, that *Sanmiguelia* was a palm(?) with entire leaves. Other puzzling questions arise from the complete absence of fossil fruits, seeds, and wood. Palm wood (palmoxylon) is not rare in geologically younger rocks and often occurs in conjunction with fruits and leaves. The Dolores sandstone which contains *Sanmiguelia* originated as a continental sand deposit probably in a large inland body of water. Old leaves dropped to the ground, were washed or blown into the lake, and covered with sand while the stems or trunks remained in place to decay near the shores. Quite possibly the stems of the species did not lend themselves to preservation because of fibrous and porous construction which is subject to quick disintegration. The leaves, as in most palms, were probably extremely tough. Organic material is now absent in the fossil leaves so that original compressions resemble mere impressions.

Since the Dolores Formation consists of a relatively solid, red sandstone of thick slabs and blocks and an unpredictable cleavage, the specimens had to be removed with hammer and chisel, pickax and crowbars from blocks often weighing hundreds of pounds. Some of the blocks could not be budged nor the fossils freed from their imprisonment. In many cases the leaves cracked or broke into fragments before extraction from the matrix. In all there were over one hundred leaves, but only the best preserved were retained. They are now deposited at the Paleontology Museum of the University of Michigan, awaiting Dr. Arnold's scrutiny and interpretation. One specimen is displayed in the paleobotanical exhibit of The New York Botanical Garden. The missing pieces of this intriguing puzzle, if ever discovered, may profoundly alter our present concept of the origin of the angiosperms.

It should be no hardship to venture into the rough and stark San Miguel territory, one of the most scenic in Colorado. The San Miguel River has a steep gradient and a powerful flow which makes one aware of the unmistakably dull, thumping saltation of boulders. It is snow-fed from the steep slopes of the San Juan Mountains whose peaks of over fourteen thousand feet are visible from the fossil sites just a few miles east. This range blocks any access to the Ouray-Silverton highway just over the crest. Here, the old mining town of Telluride is surrounded by towering summits reminiscent of Switzerland. An abundance of magnificent wild flowers lends color to the meadows and roadsides, and the dark coniferous forests of the lower slopes give way gradually to aspen thickets near timber line. Herds of moose may be seen and mountain lions are reported (we saw footprints only); on a narrow lumber road, a grizzly bear retreated hastily, if clumsily, to higher ground at the approach of our car. Deer and porcupines are plentiful and the streams are a fisherman's paradise. Most of the peaks are covered with perpetual snow. And so, in spite of the hard labor of chopping rock for fossils, such an unspoiled area offers at the same time all aspects of a wilderness vacation.

With only limited time available our next goal was the coal fields near Pittsburg, southeastern Kansas, just a few miles north of the Oklahoma State line. Dr. and Mrs. Gilbert A. Leisman of the Kansas State Teachers College in Emporia, acted as our hosts and guides in search of coal balls, one of Dr. Arnold's specialities. The occurrence of

This striking leaf of *Sanmiguelia* could not be budged from the rock and was left in place for future collectors.

coal balls is rare in this country, having been discovered only about forty years ago. They are of Pennsylvanian (Carboniferous) age, ranging in size from a few inches to two feet in diameter. The round, flattened, or irregularly shaped masses contain compressed plant material indurated primarily with calcium carbonate. Sectioning reveals plant structures in minutest detail so that a segment of the then existing flora may be reconstructed. A more recent and quicker way to prepare coal balls for study involves the acetate film method which yields pliable and durable "peels" of exceptional detail.

The open-pit coal mines in southeastern Kansas are rich in this material, to the detriment of the mining companies which must discard them, but they represent an evolutionary paleobotanical treasure. Rock and debris removed as the barren overload of coal seams form the mine dumps between water-filled excavations. Coal balls are intimately associated with the upper layer of coal and are therefore mined with the coal and later added to the dumps. Not all coal balls are of scientific value, because many contain only iron pyrites or highly macerated, unrecognizable plant debris. But the search during a few hours may yield several hundred promising specimens. Their final paleobotanical value can be determined only in the laboratory after sectioning. Some of these coal balls are now displayed in the museum exhibits of the Botanical Garden together with a method of peel-making and the sequence in the coal series from sphagnum moss to anthracite.

Dr. Chester A. Arnold examines promising specimens of coal-balls on the dumps of the Midway Mineral Mine, southwest of Pittsburg, Kansas.

CONVERSATIONS ON ECOLOGY XIII

The present series was initiated in the January-February 1962 issue of *The Garden Journal* by Dr. Pierre Dansereau, Assistant Director (Botany) of The New York Botanical Garden. It was intended as an "informal exchange" on the topic of "Vegetation Management." Nine other contributors have taken part and the variety of their backgrounds and points of view has been remarkable. Although many problems have barely been touched upon, and the topic under consideration for two years is hardly exhausted, a fresh start will be made in 1965. Meanwhile, Dr. Dansereau winds up the first series, which will be reprinted as an issue of "Sarracenia."

Dear Luna:

You are the one who posed the question: "What kind of land do we want to live in?" I shall therefore address my comments to you, in my effort to wind up this first series of "Conversations on Ecology" which were intended to bear upon *Vegetation Management.*

I had argued, in my initial letter, that exposure to pesticides was part of the same problem as radioactive fall-out and called for the same kind of decisions on our part, not as scientists but *as citizens.* I should like to make the point, once more, that our principal function *as scientists* is to enlighten and inform, not to direct or to decide. If I had "lumped together" thalidomide, radioactivity, and pesticides, as Dr. Jukes says, it is not only because they are the misused gifts of a progressing technology. It is even less because I reject technical advances and automation. I too claim to be happily adjusted to this half-century. It is because both the liberal and the conservative refusal to engage in rational planning seems ill-advised to me.

The management of our environment as a whole is the central issue we have all faced in these exchanges. It is in this preoccupation with the conjugated forces of life and environment that we stand apart from other biologists. Indeed, ecologists are not biologists in the same sense as anatomists, taxonomists, or physiologists are. They differ from these colleagues in have to *define and measure the kind and rate and supply of resources which environment provides as well as the kind, intensity, and duration of response on the part of the living members of the ecosystem.*

I feel bound to agree with Ray Fosberg that we can still call *ecology* the science which, in its present phase, deals with the cycling of resources. I am not sure, dear Frank Egler, that it must be purified by a second baptism and called "ecosystemology."

Of course, definition is at the beginning and at the end of every scientific venture. And so is nomenclature. And there are semantic hurdles at every step. John Milton has flashed before us a number of very revealing images which reflect some distortions and misapplications of our findings. But in the facets which more truly reflect "ecological thinking" we may indeed find more convergence than imitation. In other words, the very requirements of a less philosophi-

cal and more scientific sociology, a less historical and more mathematical economics, a no less esthetic but more horticultural landscape architecture, a less man-centered medicine, lead them up convergent paths. It is only when this approximation has been consciously faced that sociology, economics, medicine have borrowed the vocabulary and some of the techniques of ecology. I wish I could say that this has been a two-way process and that many ecologists have acquainted themselves with the language of the sciences of man (from anthropology through sociology and economics to political science). This is not to say that "they" understand "us" better than we understand them, or that they have taken great advantage of the acquisitions of ecology (however defined). John Milton quotes sociologist Firey's excessive emphasis upon "climax" as an example of over-emphasis or even misunderstanding. Maybe Frank Egler would say: *arrested* understanding since this particular lag stems from the "old" ecology.

Surely there is no greater need than the improvement of communication. Rachel Carson, whose premature death we greatly mourn, has liberated ecology from some of its shackles and reached new audiences. This has been achieved by an ecologist who is not restricted to the language of the clan, but is on speaking terms with the whole of the English language, is not ashamed of knowing poets and speaking as they do. It is a sign of the times, I hope, that several scientists are beginning to speak thus in many voices. It was a source of great joy to me that the Ettinger Foundation was set up recently with the purpose of furthering good writing in the sciences. It did itself very proud indeed, a year ago, by awarding its first medal to Paul B. Sears who, these many years, has stood against the current of science-for-scientists and given the general reader so many excellent books to read.

As for the food that pure science brings to applied science—and the money that applied science metes out to pure science, it involves us in a similar social conflict. Obviously the "men of power," even the sophisticated ones who get their culture not only from *Fortune* but from *The New Yorker* are polarized towards applied science and pick up their knowledge from the engineering and the medical professions, not from the universities.

Maybe we should not be too concerned about this, if we really believe that applied science cannot progress without a steady influx from pure science. The need for ecological research will be so strong as to force society to acknowledge it? Meanwhile, as Dick Goodwin points out: where do we stand, on this question, on the university campus? How are we solving the problem of providing an intellectual challenge (especially to beginning students) and relating it to present-day social and political issues? What curtailments, what sacrifices are we willing to make?

Virginia Weadock is alarmed by the unthinking attitude of the tourist. She is justly skeptical of this desire to preserve natural beauty. And at the same time she is more than a little suspicious of the benevolent take-over by federal agencies. She has well documented a particular case where it is possible that outworn texts are being made to justify obsolete or risky practices. She raised some of the issues of conservation education which are so basic to any conceivable implementation of even the best conservation legislation and practices. If we accept Dick Goodwin's statement to the effect that the conservationist is merely "holding" natural areas until such time as the tide of population overwhelms and neutralizes his very purpose, we who are concerned with *Vegetation Management* are playing an uncertain game. We cannot teach anything at all to students whom we have not convinced that our knowledge is relevant and worth the effort of learning!

And come to think of it: have we defined *Vegetation Management?* Ray Fosberg seems to have cut it off at both ends, so to speak. Agriculture, he says, is not vegetation management and, of course, preservation is not either. The picture which he conveys of the Pacific Islanders and their behavior in their landscape tempts me to say that, like Molière's Monsieur Jourdain, who was so delighted to learn that he had been speaking prose all his life, these people often did "manage" vegetation without knowing it.

Surely the people of whom Peter Wardle speaks have long ago reached the conscious level of management. Indeed, not being averse to socialization, the New Zealanders already have a long record of very intelligent planning. Their latest and potentially important venture consists in tapping the hydrothermic power of their great volcanoes.

Egler, Humphrey, and Wardle are full-time ecologists. It is only natural that they should have stressed the value of their product to society. Fosberg and Goodwin, who also have interests in neighboring fields, are looking the same way. Young Milton is a conservationist of the new school, steeped in the social as well as the biological sciences. I do not think that any of them have been narrow, any more than Rachel Carson was. Jukes, in speaking for the "other side," and as a positive contributor to welfare, is justly impatient of the sentimental and the righteous. I think men in his position may well be hurt by the fact that too many conservationists can take no pride in the achievements of technology. But I do think it was exceedingly good to have you, Luna, pose the ultimate question of values upon which our essential decisions will always rest.

Dr. Jukes, picking up some of the threads of a previous discussion, challenged some of the very questions I had posed at the end of my first letter. He and I know that they are not answerable in a final way. "Do you really believe that biological control can work on a large scale? What is the extent of damage caused to date? how much of it is irreversible? By what margin will our standard of living be reduced if we substantially curtail spraying?" (This question resembles the one about disarmament, does it not?)

Expert after expert has said: "We do not know." And some have said: "We do not know for sure that there is danger" and others have said: "We do not know for sure that there is no danger." And those with the power to decide have said: "Let us go ahead," or "Let us hold back." And this four-cornered game can go on and on. And almost everybody can be pacified if we all agree, on the television screen, in town meetings, and in high-brow and low-brow magazines that "more research is needed."

These letters have ranged, therefore, through the various phases of man's play in nature. The balances which are most favorable to man's present purpose will go on shifting with that purpose itself. However, a wise administration of our whole environment will rest more and more upon an ex-

plicitly ecological knowledge. There is not nearly enough of that in the minds and books of the ecologists themselves, of course. And it is more than urgent to develop more research, *while there is time!* A recent review of the state of Ecology in *BioScience*[1] is rather pessimistic. As for the utilization of ecological concepts, methods, and data by others, this is a huge task also. No, we do not have a well-focused science of vegetation management. (Frank Egler, can you be persuaded to write a book on the subject? It will be our first text! And who would be without a book? If only to throw?)

You well know that all this is very much in earnest, Luna; that we ecologists do have something of great value to offer—yes, to give, not to sell!

Yours sincerely

Pierre Dansereau

[1] BioScience, special issue: Ecology. July 1964, pp. 7-41.

TRYON PALACE GARDENS (Continued from page 230)

State, where the Tuscaroras had been planting the corn since their exodus two centuries ago from their native East Carolina.

Two eighteenth-century English pumps are on the Tryon Palace grounds, with a sandstone horse trough and dog trough. Also to give an authentic appearance, thirteen English barrels are set in different places. Seven antique English lanterns and eight terra-cotta urns of that period have been erected at points of interest to complete the scenes of long vistas for which the English were justly noted.

Palace grounds are landscaped toward the picturesque Trent River waterfront. On each side of a wide expanse of lawns planted with common Bermuda grass is an extensive "wilderness" area, with numerous trees, plants, shrubs, and old-fashioned flowers. The wire fence protecting the grounds is intertwined with Cherokee roses; and outside are continuous plantings of poncirus.

Overlooking the water are two large circles, outlined with dwarf yaupon, for flagpoles; these are designed like those of the eighteenth century. On one pole flies the British Red Ensign, which was used by England when the Palace was the seat of the British Government in the Colony of North Carolina. On the other pole is a replica of the Stars and Stripes carried by North Carolina militiamen at the battle of Guilford Courthouse in 1781 during the Revolutionary War, when the Palace was the Capitol of the independent State of North Carolina. Both flagpoles have wind streamers at the top, with lower signal flags which spell out messages under the International Code of Signals.

In the rear of the stable wing is a brick patio which fronts a poultry house. Historical records prove that Royal Governor Josiah Martin, who succeeded Governor Tryon, contracted with John Hawks for a poultry house, dovecote, and smoke house on the Palace grounds. All three have been reconstructed in eighteenth-century style. Indian game fowl of a breed of that day are kept in the poultry house and its adjoining poultry yard, which is fenced in by ten-foot-high white pickets.

Since the Restoration buildings and grounds are open to the public daily except Mondays and certain holidays the year around (for admission fees of $2.00 for adults and $1.00 for children through high school age), hundreds of colorful blooms of varying kinds are nurtured from season to season. During the coldest weather red and yellow crocus offer a blanket of color for the many evergreen shrubs and trees. Red and yellow berries are on the holly trees and yaupon hedges. Violas, pansies, violets, narcissi, jonquils, and daffodils also venture into blossom in wintertime.

When spring comes, dogwood and fruit trees burst into bloom. Last year there were fourteen thousand tulips, two thousand hyacinths, and thousands of other bulbs and plants in brilliant array during late March and early April. Pink phlox made its way gracefully through crannied nooks in stone walls.

Portulaca, vinca, verbena, coxcomb, and other old-fashioned flowers furnish summertime color. Sweet-shrub and cape-jasmine provide sweet odors as well as exciting displays. Crape-myrtle trees retain their color throughout the warm weather. In the fall there are marigolds, chrysanthemums, lantanas, and other flowers.

Chives add their lavender touch in the kitchen garden. There, too, may be seen the feather purple crest on the French or burr artichokes.

The panicled goldenrain-tree is one of the most dazzling of the many trees on the grounds. Oleanders, viburnums, vitex, and magnolias also gleam brilliantly in the sunshine.

The eight acres of land with so many plantings require constant and diligent care. In winter a green manure crop, usually oats or winter peas, is used to build the soil, particularly in the kitchen garden. Compost, stored in bins at the back of a nearby Palace parking lot, is continually moved into the beds. Irish potatoes are raised organically.

All the vast amounts of labor, planning, and maintenance bring excellent results. The Tryon Palace gardens have attracted thousands of appreciative visitors from near and far. Numerous garden clubs have made pilgrimages to the Restoration to study and admire the wealth of diverse plant material growing so healthily and beautifully in Old World gardens which have been recreated in the New World.

WINTER INJURY DEFINED (Continued from page 222)

scald or frost cracks on a newly planted deciduous tree can often be avoided by wrapping the trunk with burlap or other suitable covering. Difficult evergreens need a natural or artificial windbreak and sunshade.

A natural covering of snow is an ideal winter protection for low-growing evergreens and for deciduous plants subject to flower-bud injury and twig killing, since it prevents both drying winds and low temperatures from reaching the plants. The flower buds of forsythia and flowering quinces survive where they are covered by snow. Where deciduous plants are killed back to the snow-line every year, every effort should be made to plant them where natural drifts will likely cover them. In areas where a covering of snow is often lacking, artificial protective measures will prove helpful in reducing winter injury to this important group of plants.

Red-breasted nuthatch *(Sitka canadensis)* perched on the hand of Edward McGuire, a Garden employee. The photograph was taken on a very cold day in the winter of 1964.

MY FRIENDS, THE WILDLINGS OF THE NEW YORK BOTANICAL GARDEN

By Arthur W. Ambler

Mr. Ambler has for years been photographing wild flowers, birds, and other animals which are to be found at The New York Botanical Garden, He is a member of the Garden, also of The New York Zoo-igocal Society, and of the National Audubon Society.

Part VII—Winter Again

Boughs are daily rifted
By the gusty thieves,
And the book of Nature
Getteth short of leaves.

No shade, no shine, no butterflies, no bees,
No fruits, no flowers, no leaves, no birds.
November!

Thomas Hood

Now it is winter again and the cycle of the seasons begins anew. I strolled around the grounds on a winter night, and though all the Garden was arrayed in winter attire, I came upon a small segment, viewed from the path leading to the Thompson Memorial Rock Garden and the Native Plant Garden, which caused me to pause and dwell upon its singular beauty.

The night was very cold and still, except for the gentle whisper of the wind playing among the barren trees and shrubs. The moon shed, through the curtain of the clouds, a silver light which hallowed the whole with beauty and softness. I stood silently admiring the scene, and thought what a wonderful and satisfying year it had been. My visits to the Garden had indeed been profitable, for I had spent many happy hours in observing and photographing its attractions. I had learned a good deal about nature because the Garden is a living textbook, its pages available to all. The visitor to the Garden can, if he wishes, find an abundance of material for scientific study. Most people, however, turn to nature for entertainment and relaxation. Its esthetic values have popular appeal; the joys of nature are in the seeing and, in the words of William Cullen Bryant,

To him who in the love of nature holds
Communion with her visible forms, she speaks
A various language; for his gayer hours
She has a voice of gladness, and a smile
And eloquence of beauty, and she glides
Into his darker musings, with a mild
And healing sympathy, that steals away
Their sharpness, ere he is aware.

It is the trend of the times to travel distances to see if "the grass is greener" elsewhere than in one's own vicinity; and in the speed of modern means of travel, we skim over the surface, missing the dramas which unfold during leisurely observation of the small things in nature. May I suggest to the readers of *The Garden Journal* that they walk through the grounds of The New York Botanical Garden from season to season and enjoy its many attractions.

A winter scene at The New York Botanical Garden in early January, 1964.

We are old; the wild winter a shimmering fleece
Of snow on our age-blackened branches has laid;
We are willing to live; but of death unafraid,
Our spirits are charged with the splendorous peace
Of an evening sky. —ANATOLE LE BRAZ

COMING EVENTS
at
THE NEW YORK BOTANICAL GARDEN

(For detailed information about a particular event or course, white or phone LU 4-8500.)

SATURDAY AFTERNOON NATURE WALKS continue through December 12, 1964. Starting point, Museum Building, 1:30 p.m.

"NATURE SPEAKS TO ART," illustrated Saturday Afternoon Lecture by Ruth H. Smiley, on November 7, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

CHRYSANTHEMUM SHOW in the Conservatory, November 8-22, 1964, 10 a.m.-4 p.m.

"THE ABC ISLANDS—ARUBA, BONAIRE, AND CURACAO," illustrated Saturday Afternoon Lecture by James Fanning, on November 14, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

"LANDS OF THE MIDNIGHT SUN," illustrated Saturday Afternoon Lecture by Gertrude J. Helbling, on November 21, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

EXHIBIT OF LANDSCAPE AND PLANT PHOTOGRAPHS, all of New York Botanical Garden subjects, by John Mui, editor and nature photographer, November 22-December 15, 1964, Museum Building.

"PICTURESQUE ALASKA," illustrated Saturday Afternoon Lecture by E. Dorothy Swindells, on November 28, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

"MEXICO-GUATEMALA—INDIAN LANDS OF INCOMPARABLE PLANTS AND GARDENS," illustrated Saturday Afternoon Lecture by Phil Clark, on December 5, 1964, at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

Visitors stroll by the chrysanthemum borders, admiring the colorful blooms.

HOLIDAY TOUR IN NEW YORK CITY, sponsored by the Advisory Volunteers of The New York Botanical Garden, December 10, 1964.

"EUROPEAN CHATEAUX AND THEIR GARDENS," illustrated Saturday Afternoon Lecture by Raymond M. Owen, Jr., on December 12, 1964 at 3:15 p.m., Auditorium of the Museum Building. Preceded by a half hour of recorded music.

CHRISTMAS SHOW IN THE CONSERVATORY, December 12, 1964-January 6, 1965, 10 a.m.-4 p.m.

ILLUSTRATED LECTURES, sponsored by the Advisory Volunteers of The New York Botanical Garden, at the French Institute Building, 22 East 60th Street, New York, N. Y., January 7, 14, 21, 28, 1965, at 11 a.m.

WINTER IDENTIFICATION OF TREES AND SHRUBS —10 a.m.-12 noon, January 9-February 27, 1965. Museum Building.

CRYPTOGAMIC BOTANY—morning class, 10-11:30 evening class, 8-9:30 p.m., January 11-March 8, 1965. Museum Building.

PLANT PESTS AND DISEASES—morning class, 10-11:30 a.m.; evening class, 8-9:30 p.m., January 14-March 4, 1965, Museum Building.

Admission to Saturday Afternoon Lectures, 25 cents, free to members of the Garden (upon presentation of membership card).

Nature Walks, fee $1.00 per person.

For fees of the various courses, see the Educational Program.

NEWS, NOTES and COMMENTS

Activities of the Director and Staff. Dr. William C. Steere, Director, attended the Tenth International Botanical Congress, held in Edinburgh, Scotland, and participated in various symposia. He presented several papers, among them one entitled "The North Temperate Bryophyte Flora as Affected by the Quaternary Glaciation." In the past few months Dr. Steere has attended the annual meeting of the American Institute of Biological Sciences, held in Boulder, Colorado; meetings of the State Museum Advisory Council in Albany, of the Organizing Committee for the Seventeenth Horticultural Congress (to be held in Maryland in 1966) in Washington, D. C., the Regional Conference in New York City (on undergraduate courses and curricula in the biological sciences) conducted by the Commission on Undergraduate Education in the Biological Sciences, and the annual meeting of the American Association of Botanic Gardens and Arboretums, held at Planting Fields. Dr. Steere was the speaker at the Distinguished Scientist Lecture of the Academy of Sciences in Philadelphia, and he addressed the Little Garden Club of New York City on the occasion of its thirtieth anniversary and the banquet-meeting of the National Capital Garden Clubs League in Washington, D. C. He will address the Royal Canadian Institute in Toronto on November 14, as part of the 1964-1965 series of popular scientific lectures, and will attend the annual meeting of the American Association for the Advancement of Science in Montreal in December, 1964.

Since midsummer Dr. Stanley W. and Dorothy M. Greene have been assisting Dr. Steere in his research, under a National Science Foundation grant, on bryophytes of the Anartic.

Dr. Pierre Dansereau, Assistant Director, (Botany), has been elected an Honorary Member of the Royal Society of New Zealand. He participated in a "Conference on Principles and Methods in Integrating Aerial Survey Studies of Natural Resources for Potential Development," held at Toulouse, France, September 21-28, 1964. He presented a paper entitled, "Cartographie des structures de végétation à Puerto Rico," which discusses the results of work done in Puerto Rico with the assistance of Peter Buell. From October 20-25, 1964, Dr. Dansereau took part in the twenty-fifth anniversary of the Foundation of the Higher Council for Scientific Research (Consejo Superior de Investigaciones Científicas) at Madrid, Spain, at which he presented a paper entitled, "Le contrôle de la végétation dans les iles océaniques." Also in October,

1964, he gave several seminars to the Department of Botany, University of Durham, at Durham, England.

Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Research, joined Dr. Ramon Ferreyra, Director of the National Museum of Peru, on an expedition into the jungles to study the Guttiferae Family. They sought to recollect herbarium specimens originally found by August Weberbauer, the Great German botanist. His herbarium specimens were destroyed during World War II.

Dr. Howard Irwin, Associate Curator, and Dr. Ghillean Prance, are on an expedition in central Brazil in cooperation with the Universidad de Brasilia.

Dr. Arthur Cronquist, Curator, attended the Tenth International Botanical Congress in Edinburgh, July 31 to August 12, 1964, as the major activity of a three-week trip to Britain, July 24-August 12. He studied at Kew, the British Museum, and the Linnaean Society in London, and did some botanizing in England and Scotland. During September he attended a "Symposium on Biochemical Evolution" at Rutgers the State University, New Brunswick, New Jersey; paid a site visit to Tucson, Arizona, for the National Institutes of Health; and went to Washington, D. C., for the National Academy of Sciences, to take part in the selection of NSF postdoctoral fellows for the coming year. Later in the fall he was in Washington for several days, serving on the panel in systematic biology of the National Science Foundation.

Dr. Cronquist plans to attend the meetings of the American Association for the Advancement of Science to be held in Montreal between Christmas and New Year's Day. On December 30, 1964, he will give a paper on "The Status of the General System of Classification of Flowering Plants."

Dr. Tetsuo Koyama, Associate Curator, will have submitted the following papers for publication before the end of this year: the first, in collaboration with Dr. Bassett Maguire, on *Cyperaceae*—tribe Lagenocarpeae, IN Maguire, B., "Botany of the Guayana Highland," Part VI, in *Memoirs of The New York Botanical Garden;* "The *Cyperaceae* of Micronesia" in *Micronesica* 1: (1), July, 1964; "Interrelationships between the tribes Lagenocarpeae and Sclerieae" in *The Bulletin of the Torrey Botanical Club;* and "Taxonomic Studies of *Cyperaceae*," Part 14.

Dr. Caroline Allen, Research Associate, spent three months, June 1-September 1, 1964, in making a survey of tropical American *Lauraceae* in some of the herbaria on the continent and in Great Britain. The institutions visited were; Jardin des Plantes, Paris; Conservatoire et Jardin Botaniques, Geneve; Naturhistorisches Museum, Wien; Botanische Staatssammlung, München; Jardin Botanique, Bruxelles; Rijksherbarium, Leiden; Botanical Museum and Herbarium, Utrecht; The Royal Botanic Gardens, Kew; and the British Museum (Natural History), London. During a few interesting days at the Tenth International Botanical Congress, Dr. Allen paid a brief visit to the herbarium of the Royal Botanic Garden in Edinburgh. The trip proved extremely valuable in ascertaining where the best available material for any given collection, particularly types, is located. In addition to the survey of specimens, contact with the older European herbaria and their personnel was a rewarding experience.

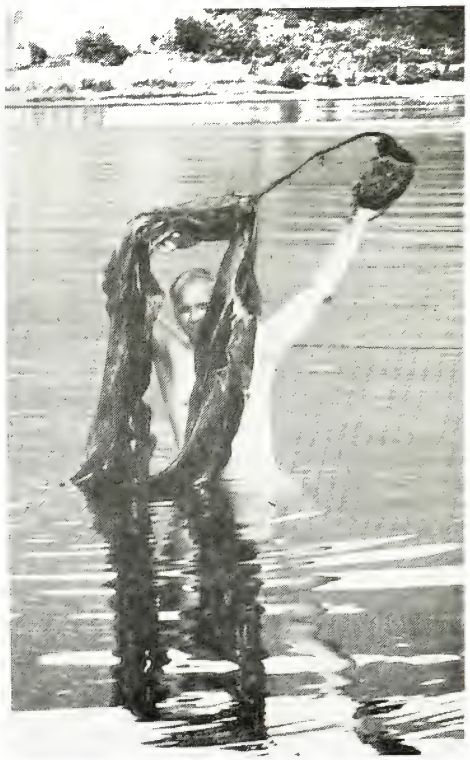
Dr. Herman F. Becker, Research Associate, taught a summer session on "Plants and Man" for the Department of Botany at the University of Michigan until August 15, then enjoyed a vacation trip around the Gaspé Peninsula and to Laurentian National Park and Montreal, Quebec, before returning to The New York Botanical Garden the first of September.

Dr. Becker has received advance proof of a U.S.G.S. topographic map, the Metzel Ranch Quadrangle, Montana, on which his Ruby Flora plant fossil area will be designated "Fossil Basin" and several fossil local.

A paper on the "Cenozoic Paleontology, Stratigraphy, and Reconnaissance Geology of the Upper Ruby River Basin, Southwestern Montana," was published September 15, 1964 (Contrib. Mus. Paleont. Univ. Mich.) The authors, Dr. John A. Dorr, Jr., and Dr. Walter Wheeler, of the University of Michigan, have drawn on the results of Dr. Becker's fossil investigations since 1947. Six of his papers are cited and considerable credit is given to his work. Dr. Dorr and Dr. Wheeler were graduate students and companions during preliminary investigations of the Ruby Basin in 1947. They deferred publication of their subsequent studies until Dr. Becker's paleobotanical research and interpretation were nearly completed.

Noel Holmgren, a graduate student in the Herbarium, returned in mid-September after spending the summer in botanical fiield work in Nevada.

John Grear, Gary Smith, Charles LaFrance, and Eileen Carroll are new graduate students in



Laminaria hyperborea, a kelp, in a narrow inlet from the Atlantic Ocean near Fort William on the west coast of Scotland. This plant was attached to a rock on the sea bottom at approximately the point where the picture was taken by Claude Weber in August, 1964. Dr. Arthur Cronquist holds the kelp and rock.

Fossil stumps of *Lepidodendron,* a paleogoic relative of the modern club mosses. These stumps are about 200 million years old. Technically, they are fossil casts. A greenhouse-type structure has been built around them to preserve them from weathering and vandalism. Dr. Arthur Cronquist took this picture in Victoria Park, Glasgow, Scotland, in August, 1964.

Mrs. John Brown, and her daughter Madeleine and son Peter, of Maidenhead, England, inspect some of the dahlias in the trial garden. Mr. Brown is President of the National Dahlia Society of England.

Dirk Eveleeond Maarse, of the firm of D. Bruidegom of Baarn, The Netherlands, with one of his originations, 'Frontispiece'.

Left. Mrs. Helen Seaman holds one of the new varieties which Bertram Pelt and Larry Palminteri are rating in the trial garden of the American Dahlia Society at The New York Botanical Garden.

Below. Some two hundred members and guests of the American Dahlia Society, which held its fiftieth anniversary show and annual meeting at the Hotel New Yorker, New York City, visited The New York Botanical Garden on September 20, 1964. Here they are leaving the dahlia trial garden for a tour of the Garden.

the Herbarium, working toward the degree of Ph.D. at Columbia University.

Dr. Clark T. Rogerson, Curator of Cryptogamic Botany, spent two weeks this past summer at the University of Michigan Biological Station, Pellston, collecting and studying hypocreaceous fungi. He attended the annual foray and meetings of the Mycological Society of America held at the University of Colorado, Boulder.

Dr. David J. Rogers, Curator of Quantitative Taxonomy, and Henry Fleming, Research Associate, attended the "Conference on Microbial Classification," held in Quebec, August 30-September 5, 1964. On December 29, 1964, Dr. Rogers will present a paper in the symposium entitled "Plant Biology Today. Advances and Challenge"; his paper will deal with the problems of mathematical models and computer programs for classification. The symposium will be held during the meetings of the American Association for the Advancement of Science in Montreal.

This past summer a single-day meeting was held at The New York Botanical Garden to discuss problems of the development of mathematical models and the use of computers for general problems at a botanical garden. Among the invited guests were prominent biologists, mathematicians, and computer experts.

Dr. Michael Wirth, who received his Ph.D., from the Henry Shaw School of Botany and the Missouri Botanical Garden, has joined the staff of the Department of Quantitative Taxonomy. His interests lie in the classification of the orchid tribe Oncidiinae and the lichen family *Graphidaceae*. Dr. Wirth will participate in the development of models and programs for computer classification. He is a Research Associate, working under funds from the Office of Naval Research.

Mr. George Estabrook, who received his B.A. degree from Dartmouth College, is also working as a Research Associate in the Department of Quantitative Taxonomy, devoting his time and energy to the mathematical aspects of classification and computer models. Mr. Estabrook is working under funds from the National Institutes of Health.

In addition to those already mentioned, the following also attended the tenth International Botanical Congress; Dr. Rogers and Mr. Fleming, Dr. Eugene Jablonski, Honorary Curator of Tropical Botany; Dr. Annette Hervey, Senior Research Associate; Dr. George Bistis, Research Associate; Sydney W. Gould, Research Associate; Mary Fleming, Technical Assistant; and Bernice Winkler, Secretary of the Research Laboratory.

Dr. Richard M. Klein, Alfred H. Caspary Curator, attended a special "Symposium on Biochemical Evolution" at the Microbiological Institute at Rutgers the State University, New Brunswick, New Jersey, on September 17-19, 1964.

Dr. David Davis, Research Associate, attended the annual meeting of the American Phytopathological Society, held at Lafayette, Indiana, this past summer, at which he presented a paper entitled, "Cross-protection by Fusarium-wilt Suscepts with various *Formae specialii* of *Fusarium oxysporum*." Dr. Davis plans to attend the meeting of the northeast section of the American Phytopathological Society to be held at Rutgers the State University on November 5 and 6, 1964.

Phil Clark, Assistant to the Director (Public Relations), spent a week in Guatemala, checking private gardens and travel arrangements for a projected New York Botanical Garden membership tour of that area in the fall of 1965. Mr. Clark held meetings with prominent horticulturists in the Republic, including Dr. William Popenoe and Hugh Craggs, and with the Guatemala City Garden Club.

Dorothy Ebel Hansell, Editor of *The Garden Journal*, judged the anniversary flower show and attended the fiftieth anniversary banquet of the American Dahlia Society held in New York City, September 19. On Sunday afternoon, September 20, Mrs. Hansell, Miss Elizabeth Hall, Associate Curator of Education, and Mrs. Phoebe Radcliffe, Assistant in Public Relations, received the members of the American Dahlia Society with Mr. Clark at the Garden. They came especially to visit the large crescent of dahlias planted just beyond the Research Laboratory Building.

Mrs. Hansell also attended the American Horticultural Congress held in New York City, September 29-October 3, 1964, and the annual meetings of the American Association of Botanic Gardens and Arboretums and the Garden Writers Association of America, held in conjunction with the Congress. She will attend a meeting of the Holly Society of America to be held at Planting Fields Arboretum on November 12-13, 1964.

Dr. and Mrs. S. W. Greene, of the Department of Botany, The University of Birmingham, England, arrived in New York in July, 1964, to work at The New York Botanical Garden for fourteen months.

Born in Ireland, Dr. and Mrs. Greene graduated from Trinity College, Dublin, and then moved to Wales where Dr. Greene spent four years as a staff member of the University College of North Wales, Bangor. During this period, Mrs. Greene was a bacteriologist in the Area Pathological Laboratory of the Welsh Regional Hospital Board. In 1955, they were appointed to the staff of Birmingham University.

Dr. Greene specializes in systematic and experimental bryology and has published a num-

ber of papers in these fields. He is also keenly interested in the botany of antarctic regions and is Research Supervisor in Botany to the British Antarctic Survey. During the southern summer of 1960-61, he led an expedition to South Georgia, an island of the Scotia Arc, lying between southern South America and the Antarctic Peninsula. He has published a number of papers on the vascular flora of Antarctic regions, his latest being *The Vascular Flora of South Georgia.*

Dr. Green has been accumulating antarctic bryophytes since 1957, and during his stay at the Garden will be collaborating with Dr. Steere on a Manual of Antarctic Bryology, using these and American collections.

During January and February 1965, Dr. Steere and Dr. Greene hope to visit East Antarctica to carry out field work in the vicinity of McMurdo Sound and Cape Hallett.

The Gertrude S. Burlingham Fellowship in Mycology for 1964 at The New York Botanical Garden was awarded to Rosa T. Guerrero, Department of Biology, University of Buenos Aires, Argentina. Miss Guerrero spent September and October in the Cryptogamic Herbarium, studying specimens of the jelly fungi (*Basidiomycetes*-Tiemellales).

The Henry Allan Gleason Award of The New York Botanical Garden was presented to Ira Loren Wiggins of Stanford University, California, at the banquet of the Botanical Society of America, held in Boulder, Colorado, on August 26, 1964. Dr. Wiggins was selected for the award because of his great contribution during the last few years to the floristics and ecology of, first, Alaska and, more recently, the Sonoran Desert vegetation.

The New York Botanical Garden Award for 1964 was presented to William A. Jensen, Professor of Botany at the University of California for his development of histochemical techniques for application to plant materials and for his contributions relating to the biochemical aspects of plant growth and differentiation.

Left. Michael Kloczkowicz and Irene Glinski, two visitors to The New York Botanical Garden, study one of the Composites, a yellow inula from India, in the Systematic Border.

Below. The Systematic Border at The New York Botanical Garden contains seventy of the three hundred families of flowering plants, arranged in their evolutionary order. Here Odell Hobbs and Michael Keenan weed among the Gourd Family. The young men are members of the gardener-trainee program set up by the New York City school system and the Garden.

VISITORS TO THE GARDEN

Dr. Carl C. Moh, of the Interamerican Institute of Agricultural Sciences at Turrialba, consulted with Dr. David J. Rogers this past summer on the cytological studies of *Manihot.*

Dr. Julian Steyermark, of the Institute Botánico, Caracas, Venezuela, arrived the end of August and will be at the Garden until spring, studying the *Rubiaceae.*

Dr. Bao-yu Yang, of the Department of Botany, National Taiwan University, Taiwan, spent several days in the Cryptogamic Herbarium studying liverworts; Dr. Paul L. Lentz, of the National Fungus Collections, Beltsville, Maryland, spent a week checking the Garden's fungus specimens from Mississippi; and Waldo R. Lazo, of the University of Chile, Santiago, spent a month in the Cryptogamic Herbarium and the Library, working on fungi.

A. D. Stevens, foreman in the Arboretum of The Royal Botanic Gardens, Kew, England, was quite impressed with The New York Botanical Garden generally. Mr. Stevens remarked, "It's very difficult to compare to our garden—it's so different." He emphasized the natural rock outcroppings at The New York Botanical Garden and its hills.

Dr. Arturo Gomez Pompa of the Jardin Botánico, Universitario de México, who is spending a year in the herbaria of Harvard University, studying material in preparation of his Flora of Vera Cruz, spent the last week of September at The New York Botanical Garden.

Dr. Otto Degener, Collaborator in Hawaiian Botany, and Mrs. Degener, of Wailua, Oahu, visited The New York Botanical Garden the last week of September, 1964, to consult specimens in the Herbarium.

Derek Burch, University of Florida, Gainesville.

Dr. Yves Desmarais, Director, Montreal Botanical Garden, Montreal, Quebec.

Dr. and Mrs. David B. Dunn, University of Missouri, Columbia.

Dr. Fr. Huiling, Laboratory of Physiological Chemistry, University of Amsterdam, Amsterdam, The Netherlands.

Dr. Robert W. Long, University of South Florida, Tampa.

Dr. J. S. Mora, Universidad Nacional, Bogota, Colombia.

Dr. Mildred E. Mathias, University of California, Los Angeles.

Dr. Carlos P. Muñoz, Universidad de Chile, Santiago.

Dr. Shigeo Nozoe, University of Tokyo, Japan (presently at Harvard University).

Dr. William Philipson, Canterbury University, New Zealand.

Dr. Peter H. Raven, Stanford University, Stanford, Cal.

Prof. H. W. St. John, Bishop Museum, Honolulu, Hawaii.

Dr. Ross Williams, Department of Chemistry, University of Western Ontario, London, Ont.

Dr. Carl L. Withner, Brooklyn College, Brooklyn, N. Y.

A Visit Abroad After Three Decades. Walter Singer, the Garden's Staff Photographer, returning to Europe after almost three decades, renewed old and made new friendships. The first stop was in Dublin, Ireland, where Dr. T. J. Walsh, Director of the National Botanic Garden, cordially welcomed and showed him the

Ilex aquifolium 'Olive Smith' was raised from seed by Harry Brokaw Smith. It is of compact habit, growing only to fifteen feet. Well-developed, glossy, scarlet berries make this spiny-leaved English holly fine for decorative sprays as well as for landscape use. The original tree, from which the seed was obtained, was planted in Plainfield, New Jersey, in 1929.

The tree is a gift to the Garden from Mr. and Mrs. Smith; transportation was provided by the New York Unit of the Herb Society of America.

indoor and outdoor plantings. The next botanical stop was the Royal Botanical Garden in Edinburgh, where the assistant to Dr. Fletcher made the visit a very pleasant one. Lack of time and some closed areas did not permit Mr. Singer to see the full magnitude of the plant collections at The Royal Botanic Gardens, Kew. Evidence of horticulture in both Belgium and Holland was outstanding, especially in the latter country, where the quality of horticultural products is superior.

A short visit to Hanover, Germany, was one of the highlights of the trip because it was there, about thirty-five years ago, that Mr. Singer served his apprenticeship in horticulture. Even though the place had been bombed seven times during the war, it was rebuilt under the guidance of Mrs. Pitschmann and her youngest son—once an infant in Mr. Singer's arms. The place is in excellent condition, in spite of the loss of the old master and three other sons.

A plane quickly carried the Singers to Berlin-Dahlem, the seat of the Horticultural Department of the University of Berlin, Germany, in the Western Zone. A fortunate coincidence made it possible to meet Professor Boetje, the Dean of the Department, retiring a week later. Professor Boetje was one of the professors under whom Mr. Singer studied horticulture; he was also a classmate of Mr. Singer's father when both were students there. Mr. Singer found the Berlin Botanical Garden, about two blocks away, in full operation again, except for the large palm house and a few adjacent greenhouses which are being rebuilt at a cost of three million dollars.

A quick glimpse behind the Iron Curtain proved very interesting; Mr. and Mrs. Singer saw some fine examples of landscaping and excellent plant material in East Berlin and Prague, Czechoslovakia.

VIGA is the trade name for the Vienna International Horticulture Exhibition this year. It is very large, perhaps too large, reported Mr. Singer, since some areas appeared somewhat empty. However, the majority of the exhibits were well designed and contained good plant material.

Probably one of the finest botanical gardens in Europe today is that in Munich; if not in size, it is certainly the best in quality. The cactus collection and the *Victoria regia* house were far superior to any seen elsewhere. In Munich, the Singers had an opportunity to visit Mr. Singer's former art professor, Professor Molzahn, who had to flee the Nazi regime but is now back and esteemed as one of Europe's modern artists.

Italian gardens and the landscaping along the French Riviera are well furnished with plants of the American subtropics, much as one sees in Florida and Texas gardens, but the designs of the gardens and plantings are, of course, quite different.

In Zurich, Mr. and Mrs. Singer met Mr. and Mrs. Alfred B. Graf from East Rutherford, New Jersey, the home of the Julius Roehrs Company of which Mr. Graf is Vice-President. While Mrs. Singer and Mrs. Graf were confined to their hotel rooms, Mr. Singer and Mr. Graf visited the Zürich Botanical Garden and the cactus and succulent collection at the Zürich See, the latter, a part of the international exhibition, is now included in a park area. Some of the greenhouses, they noticed with interest, are heated by electricity.

"Death of Trees Laid to Fumes from Cars, Trucks, and Buses" is the heading of an illustrated article which was published in *The New York Times* this past summer. John C. Devlin, under whose by-line the article appeared, quoted Dr. Pirone, the Garden's Senior Plant Pathologist, that "exhaust from cars, trucks, and buses seemed to be killing many of the trees in the city." . "The havoc occurs where vehicles must linger for traffic lights, congestion, and bus stops. Study shows that the trees get progressively healthier as you approach the middle of the block, then begin to fail as you work toward the next intersection."

Three days after John Devlin's article, *The New York Times* carried an editorial entitled, "The Air We Breathe," from which the following is quoted. "If fumes from cars, trucks, and buses can kill trees, what must they do to human lungs? This question undoubtedly arose in the minds of many who saw the striking picture in this newspaper of defoliated trees near a bus stop on Pelham Parkway, and read the accompanying comments of a senior plant pathologist at The New York Botanical Garden.

"The Clean Air Act, signed by President Johnson last December, provided for a committee of representatives of the Department of Health, Education and Welfare and of the automotive exhaust control devices and fuel

This flower garden, in the design of the Girl Scout's emblem, won first prize for Girl Scout Troop 1-131 of Soundview Houses in the Bronx, in the second annual Flower Garden Competition sponsored by the New York City Housing Authority. The purple sweet alyssum in the circle represents the Girl Scout's "friendship circle"; the yellow French marigolds the Girl Scout's "gold trefoil"; the green leaves and white seashells, the "cadette" Girl Scout's uniform.

industries to undertake technical research for the development of devices and fuel which would remove the danger. All who wish to breathe pure air will hope that speedy success will crown their endeavors."

The Torrey Botanical Club held the first of its fall-winter meetings at Rockefeller Institute on October 3, 1964. After a tour of the grounds and laboratory, dinner was served in Founder's Hall; members then exchanged summer experiences. At the meeting on October 20, 1964, in Schemerhorn Extension, Columbia University, Dr. Paul B. Sears gave an illustrated talk on "Baja, California: A Classical Desert."

Meetings are scheduled, at 8:15 p.m., on November 17, 1964, "The Green Root Parasites" by Dr. William Malcolm of Rutgers University; December 1, 1964, "Factors Controlling Vascular Differentation" by Dr. William Jacobs of Princeton University; and December 15, 1964, "Mosses in Secondary Succession" by Dr. Gily Bard of Hunter College. These meetings will be held in Schemerhorn Extension, Room 760, Columbia University.

The Pacific Tropical Botanical Garden, to be established in Hawaii, has received a charter from the United States Congress, according to W. W. G. Moir of Honolulu, Hawaii. The President of the United States signed the amended bill on August 20, 1964. Originally called the Hawaiian Botanical Garden by the Hawaiian Botanical Gardens Foundation, Inc., when promoting this project, the name has been changed to the Pacific Tropical Botanical Garden to indicate there is national need for this botanical garden and that it is for all people of this country.

The Second Annual Flower Garden Competition, sponsored by New York City Housing Authority, stirred up lively interest and competition among groups of tenants representing seventy-three developments. Winners were chosen on a borough-wide basis, fourteen tenant groups receiving first, second, and third places at a special ceremony held in the Auditorium of Carnegie International Center on September 2, 1964.

Phil Clark, Assistant to the Director (Public Relations), and Dorothy Ebel Hansell, Editor of *The Garden Journal,* who were among the fourteen judges, were impressed with the enthusiasm and pride of participation in their gardens by the tenant groups; the gardens of the younger generations were especially commendable.

XVII International Horticultural Congress. At the very successful nineteenth annual American Horticultural Congress, held in New York City, September 29-October 3, 1964, preliminary plans for the XVII International Horticultural Congress were announced. The Congress will be held more or less simultaneously with the annual meetings of the American Institute of Biological Science at the University of Maryland, August 11-20, 1966, and will be sponsored by the International Society for Horticultural Science, the American Society for Horticultural Science, and the American Horticultural Society.

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The objective of the Congress is to present the full image of horticulture, and its theme is "The Plant; The Environment; Man." The first two days on "The Plant" will be devoted to genetics, breeding, taxonomy, etc.; the next two days, on "The Environment," will take up nutrition, climatology, light, temperature, water relations, etc.; and the last two days, which are concerned with man's relation to horticulture, will deal with aspects of art, economics, education, human nutrition, and also amateur horticulture.

The twenty-first American Horticultural Congress will be held in conjunction with XVII International Horticultural Congress. Dr. Henry T. Skinner, Director of the United States National Arboretum, has been appointed Chairman of the Committee on Arrangements.

The twentieth American Horticultural Congress will be held at Callaway Gardens, Pine Mountain, Georgia, November 11-14, 1965. Fred C. Galle, Director of Horticulture of Callaway Gardens, and President of the American Association of Botanic Gardens and Arboreta, is Chairman of the Committee on Arrangements.

The Liberty Hyde Bailey Medal, the highest award of the American Horticultural Society, was presented to Robert Moses for "his dedication in bringing the natural beauty of living plantings to the many urban, suburban, and rural projects which he has so ably directed during the past four decades. As President of the 1964-1965 World's Fair, it is due to his unremitting efforts that the Fair grounds, with plans and the means for carrying them to completion already approved, will eventually blossom into a beautiful park for future generations to enjoy long after the Fair has closed." The presentation was made at a luncheon in the Indonesian Pavilion at the New York World's Fair during the Nineteenth American Horticultural Congress.

Citations were presented at the Awards Dinner, held at the Hotel Commodore in New York City during the Congress, to:

Mrs. Maud R. Jacobs of Chicago, Illinois, "for her contributions to American horticulture during the past sixty years, particularly in the Midwest. A flower show judge of long standing and an editor of the first garden page in a general magazine, she has contributed horticultural articles to many magazines and has lectured in most midwestern cities."

Professor Ira Schreiber Nelson of the University of Southwestern Louisiana, Lafayette, "for his contribution to the knowledge of ornamental plants valued in the southern United States, for over two decades of teaching students, and for his enthusiastic leadership of many a horticultural undertaking, plant exploration and friendly advice."

Richard Hooper Pough of Pelham, New York, "for his outstanding work in conservation in many organizations of national stature. By means of his writings and his dioramas at the American Museum of Natural History, he has introduced thousands to a better knolwedge of the plants which make our forests."

Mrs. Esther Grayson Rockwell of Orleans, Massachusetts, "for the generous giving of her wide experience in growing plants, in flower ar-

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ranging, and in 'war cookery.' By lecturing and writing many magazine articles and also by collaborating with her husband in writing books on various phases of horticulture, she has helped gardeners throughout America."

Frank Leith Skinner of Dropmore, Manitoba, Canada, "for a lifetime of collecting, growing, studying and distributing ornamental plants adapted to the cold prairie areas of Canada. His introductions are now at home in many gardens and his efforts to increase our knowledge of cold-resistant plants have been acclaimed on both sides of the Atlantic Ocean."

BOOK REVIEWS

CHURCH GROUNDS AND GARDENS, Wilds, Nancy. 98 pages, illustrated, Seabury Press, New York. 1964. $2.95.

Church Grounds and Gardens introduces the reader to unexplored fields of horticultural endeavor. A statement on the back cover of the book claims that this is the *only* guide to planting liturgical gardens.

This small book which has an attractive green paper-back binding is packed full of information for those interested in the creation of Church gardens. The publisher says "With the help of this book, anyone can create a reverent beauty spot—a chapel garden, an informal planting, a St. Francis garden, a retreat corner—for church or home grounds in the North, South, East, or West."

The table of contents lists fourteen chapters. Chapter Three which describes the components of a liturgical garden is most comprehensive. Chapter Five, entitled "Planning for Color" tells delightfully of the making of A Lady Garden, A Saint's Garden, and A Martyr's Garden. Liturgical garden color schemes are very informative reading. Throughout the chapters one finds lovely flower legends which are connected with religious observances.

Mrs. Wilds, who is an artist of note, has illustrated her book with twenty line drawings, depicting how the effects about which she writes can be gained.

Four sections contain most useful information to future creators of church gardens: Appendix A lists flowers associated with our Lord, plants for a Lady Garden, plants associated with Saints (Where is St. Fiacre? The Saint of Gardens is missing), flowers symbolic of virtues and flowers associated with liturgical seasons; Appendix B lists flowers and plants by color, blooming season and size; Appendix C lists climbers and ground covers; the last is a list of botanical names opposite the popular names.

Mrs. Wilds is a pioneer in the field in which she has chosen to wander, and the result of her work is a volume which is interesting and useful, too. It will be of inestimable help to many women who feel that their church grounds are commonplace and who wish to create more worshipful surroundings.

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THE NATURAL GEOGRAPHY OF PLANTS. Gleason, Henry A. and Arthur Cronquist. 420 pages, illustrated, indexed. Columbia University Press, New York and London. 1964. $10.00.

Plant geography is a sort of mistletoe science. It has claims to be an independent body of knowledge and hypothesis about the origin, history, and texture of the world's green mantle, but it derives most of its nourishment from other branches of learning, especially from plant taxonomy, plant ecology, and floristics. The phytogeographer uses terms (names) and deals in units (species) provided by the taxonomist, depends on taxonomic and floristic sources for information on the dispersal of the individual species and its evolutionary relationships, and learns from the ecologist about each plant's struggle for space in which to live and propagate its kind. To this he must add data from the fields of geography, geology, paleobotany, climatology, and soil-chemistry, and out of a mountain of heterogeneous fact synthesize a rational picture of our planet's vegetation, now and in ages past. It is a complex business, and the student seeking introduction to the subject is fortunate in having as his guides two botanists who have themselves made distinguished original contributions to the ecological, taxonomic, and floristic sources.

The Natural Geography of Plants is written in plain language, the few technical terms needed to express particular ideas being explained as they appear. In the first twenty-one chapters Dr. Gleason is concerned with the underlying principles of plant geography, and each chapter, organized around a maxim, leads the reader on to the next with admirable logic and clarity. Examples illustrating abstract principles are taken from the flora of United States and Canada, and the book is therefore likely to be most useful and most used in North America, even though the basic thesis is of universal application. Chapter 22, taking up nearly one third of the volume, is contributed by Dr. Cronquist. Here are described in broad terms the ten phytogeographic provinces generally recognized in North America north of Mexico; it illustrates the practical application of theory to the flora of a subcontinent.

This is a short book, in which every word

(Continued on Inside Back Cover)

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tells. Like good bread, it is light but solid, and can be recommended without reservation to anyone interested in its subject. Reading matter takes up about half the four hundred odd pages, the other half being devoted to carefully chosen and excellently reproduced photographs which are divided about equally between landscapes and portraits of individual trees or herbs. Each illustration ties in neatly with the text nearby, providing the reader with a graphic image of the plant-community or habitat under discussion. In short, a handsome, finely planned, well-written and elegantly produced book.

R. C. BARNEBY

HOW TO DRAW FLOWERS, FRUIT AND VEGETABLES. Zaidenberg, Arthur. 64 pages, illustrated. Abelard-Schuman, New York. 1964. $3.00.

Arthur Zaidenberg has presented another fine volume full of enthusiasm and encouragement. He urges the young artist about to draw flowers to "capture some of the delight you feel when you are surrounded by them."

There are many pages of drawings suggesting how to proceed and showing how the basic shapes of nature can be observed in flowers and fruit. A page of fine drawings of pine cones is mislabeled "acorns"; acorns are the fruit of the oak.

CHARLES C. CLARE, JR.

NATURAL HISTORY. Pimentel. Richard A. 436 pages, illustrated, indexed. Reinhold Publishing Corporation, New York. 1964. $9.75.

This is basically a first-year college biology text with supporting chapters on meteorology, climatology, oceanography, and field geology. The treatment of these subjects is, of course, not exhaustive, but these chapters do provide a good introduction to this area of natural history.

The author begins the discussion of the earth's physical features with a brief introduction to astronomy and the earth's place in the solar system. The succeeding chapters treat living organisms stressing structure and function in the broad sense; food and feeding mechanisms; life cycles; habitats and interrelationships among organisms and between organisms and environment. The whole picture of natural history is presented within an ecological and evolutionary framework.

Each chapter is provided with a bibliography and the numerous illustrations are accurate and clear.

CHARLES C. CLARE, JR.

THE BACTERIAL CELL WALL. Salton, Milton R. J. x111 + 293 pages, illustrated, indexed. Elsevier Publishing Company, Amsterdam, London, and New York. 1964. $14.50.

Most of what is contained in this book was unknown twenty years ago. Magnifications of 20,000 to 300,000 times obtained with the electron microscope have made it possible to see in the photographs reproduced here the intricate construction of the wall of the tiny bacterial cell. Sophisticated methods of chemical analysis have provided information concerning the molecules composing the cell wall, and we are well on our way to understanding how the bacterial cell goes about making the wall that protects and separates it from the environment.

ALMA W. BARKSDALE

BRIEF NOTES ON RECENT BOOKS

NATIVE PLANTS

CACTI OF THE SOUTHWEST. Earle, W. Hubert. Science Bull. No. 4, of Arizona Cactus and Native Flora Society, Inc. 112 pages, illustrated, indexed. Desert Botanical Garden, Phoenix, Ariz. 1963. Cloth $2.90, paper $1.60.

This guide to cacti found between the Sierra Nevada Mountains and the Rio Grande in Arizona, eastern California, southern Nevada, southern Nevada, southern Utah, southern Colorado, and western New Mexico, has been prepared by Mr. Hubert for laymen, students, and botanists.

Each of the 121 cacti are concisely described (also the type-locality and distribution given) and illustrated in black and white.

THE ODYSSEY BOOK OF AMERICAN WILDFLOWERS. Rickett, H. W., text; Farrell Grehan, photographs. 252 pages, 120 full color plates, indexed. The Odyssey Press, New York. 1st ed., $12.95; thereafter $15.00.

Some three hundred wild flowers from different regions of the United States are represented in this volume. The photographs are spectacular and dramatic, though it is to be regretted that the true flower-color has not been successfully reproduced in every instance. There is really no blue-flowered mountain-laurel.

Dr. Rickett has written the text in a manner easily understood by the layman and amateur botanist, each flower being identified by its prominent characteristic.

FLOWERS

THE CHRYSANTHEMUM BOOK. Cummings, Roderick W. 301 pages, illustrated (part color), indexed. D. Van Nostrand Company, Inc., Princeton, N. J. 1964. $4.95.

Culture of the chrysanthemum in garden and greenhouse, breeding and propagation, insects and diseases and control measures, classification of the various types, list of contemporary cultivars—all the information which an amateur or professional grower requires is to be found in this comprehensive treatment. The author is well qualified to write on the subject, being widely recognized as a grower and breeder of chrysanthemums.

TREES

WESTERN FOREST TREES. Berry, James Berthold. x + 212 pages, illustrated, indexed. Dover Publications Inc., New York. 1964. $1.35.

This is a corrected republication of this standard manual, originally published in 1924 by the World Book Company. The line drawings are by the late Mary E. Eaton, the botanical artist who did many of the illustrations for *Addisonia.*

THIS IS A TREE. Hutchins, Ross E. 159 pages, illustrated, indexed. Dodd Mead & Company, New York. 1964. $3.50.

The author, by profession an entomologist, is also an expert photographer. He has combined his talents and produced interesting articles for encyclopedias and such magazines as *National Geographic, Natural History,* and *Life,* and books on insect and plant life for juveniles.

This is a Tree is a companion volume to *This is a Leaf* and *This is a Flower.* Adults as well as juveniles will find the well-written text and the excellent photographs worthy of notice.

LANDSCAPE DESIGN

URBAN LANDSCAPE DESIGN. Eckbo, Garrett. 248 pages, illustrated, indexed. McGraw-Hill Book Company, New York. 1964. $16.50.

The author, prominent in landscape architecture, views landscape as the result of the interaction between man (as an individual and as part of society) and "nonhuman" nature (as a set of processes and storehouse of materials). He discusses the general physical landscape, emphasizing the urbanized areas, and attempts to bridge the gap between the several ways of looking at the landscape.

The book is divided into three sections—Discussion, Examples, and Maintenance. In the first chapter under Discussion, "Begin at the Beginning," Mr. Eckbo sets forth an interesting summary of the natural, social, and philosophical background for design; in the second he details the elements of the physical landscape and how their inter-relationships effect the living space. In Chapters III through VIII he furnishes detailed, illustrated descriptions of projects; room and patio; building and site; buildings in groups; parks and playgrounds; streets and squares; neighborhood, community, and region.

"Maintenance" is capably covered by Edward A. Williams, one of Mr. Eckbo's associates.

MISCELLANY

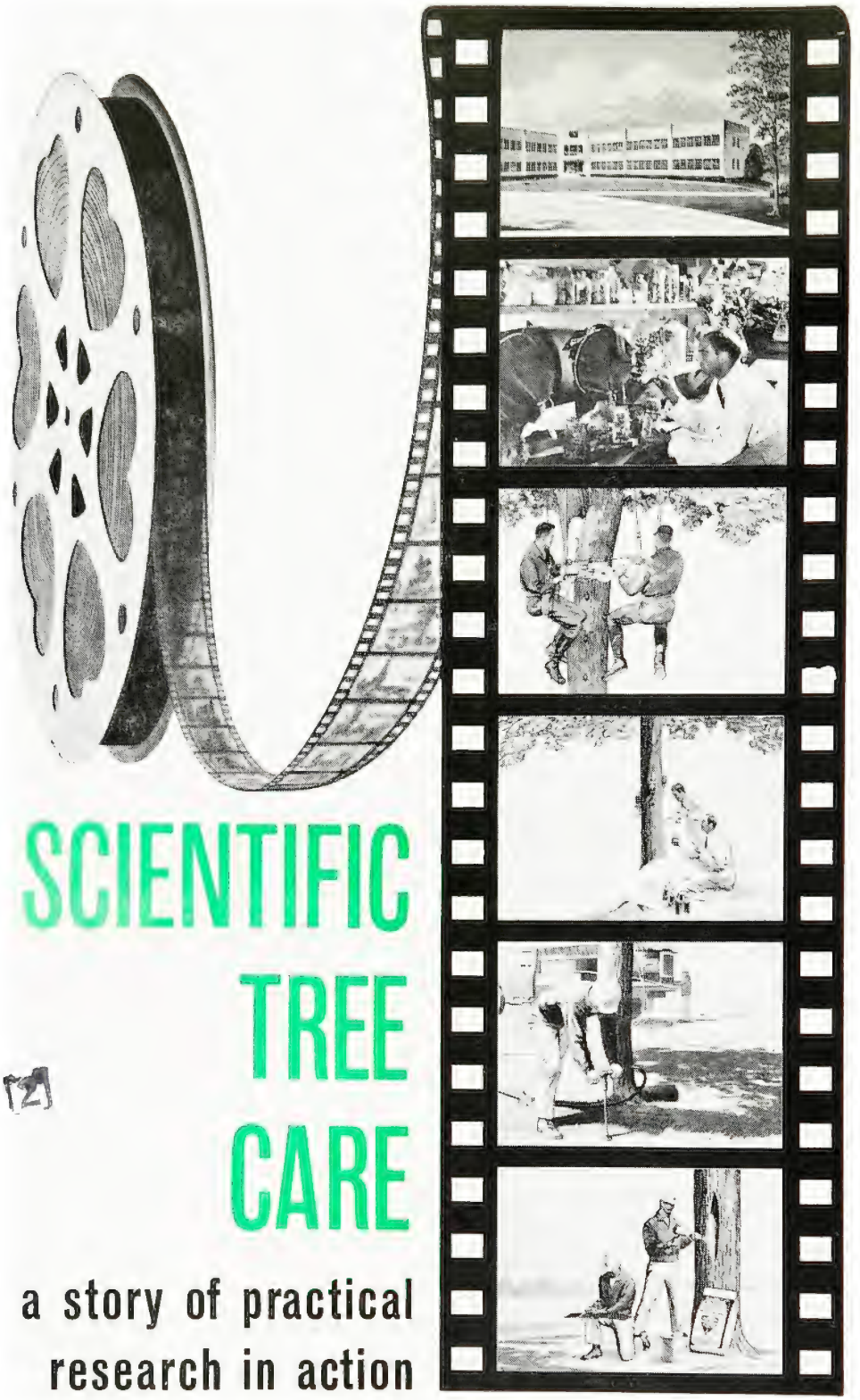
GARDENING AND COOKING ON TERRACE AND PATIO. Hogner, Dorothy Childs. 179 pages, indexed, line drawings by Nils Hogner. Doubleday & Company, Inc., New York. 1964. $3.95.

Many people enjoy terraces and patios—in urban as well as suburban localities, and in this book they will find a wealth of ideas on how to make these living areas more attractive—with hanging baskets of fuchsias, lantanas, pelargoniums, and other plants, perennial or annual; with plants containers, be they the more unusual Japanese wooden tub, teakwood tub, or redwood tub, the bushel or half-bushel market basket, or the more conventional planter-box or clay pot. Then Mrs. Hogner suggests "Culinary Plants for a Terrace Garden" or for "Wheel Spoke and Border Gardens" near terrace or patio. Potting practices and maintenance are discussed, also starting annuals. The last chapters are devoted to recipes to be used in dining on the terrace.

AN INTRODUCTION TO HAWAII. Adams, Ansel, and Edward Joesting. 96 pages, illustrated (part color). 5 Associates, Inc., Menlo Park, Cal. 1964. Cloth $9.50, paper $5.95.

Ansel Adams and Edward Joesting have collaborated in presenting through superb photographs and lucid texts two "vistas" of the Island State. "One vista is the natural beauty of Hawaii . . " "The second vista explored is the story of the island people . . ."

Those who have visited Hawaii will have their memories of its magnificent landscapes and seascapes, its beautiful plants, refreshed; those who have yet to visit the Island State will be impelled to do so.



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